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Weekly Review of Current Electrical Progress

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Vol. VI. NEW YORK, DECEMBER 12, 1885. No. 24.

THE figures of Western Union test offices are said to show a good gain over those of last year. We are glad to hear this. The telegraph lines are feeling the effects of the greater business activity.

RUMORS are still heard of a cable war, but the German government has interfered to limit the area of warfare by refusing to allow the proposed new German-American cable to land on German soil.

WE note that Mr. Preece is again to read a paper before the English Society of Arts on domestic electric lighting. He has made the subject peculiarly his own. We almost wish he had not—in the sense that we would like to see more imitators of him.

IT is alleged that the recent election of the Hon. Chas. Lilley to the Massachusetts Senate means that an attack is to be made, at the next assembling of the Legislature, on the New England Telephone Company—and, for that matter, on the American Bell Company, too. This is offered as one reason for the lower prices of Bell stock. By some people, the price is thought to be an excellent one for getting the stock at.

A GLANCE at the list of towns now lighted by electricity shows that the success of electricity has been far greater than that of gas at its first introduction. The catalogue of one company, just received, gives the names of one hundred cities in this country now lighted by their system, and sixteen foreign ones lighted or in preparation therefor. It is but a few years since the arc light was introduced, and who can say what the number of towns so illuminated will be ten years hence?

A RECENT item from Savannah announced that the mules there had been busily engaged kicking down the electric light towers. It would thus appear that the gas companies had secured new allies. But this employment of the active sympathies of mules comes too late. We cannot congratulate our gas friends on the accession to their ranks; but if the story be true, we do feel like suggesting to our electric light friends that those towers might be more securely put up.

OUR New England correspondent makes note in his letter this week of the fact that the electric light company at New London, Conn., has been too much in earnest to allow the obstacles thrown in its way to daunt it. Some of the property owners along the proposed line objected to the poles, and the company has attained its objective points by running zig-zag circuits. We like to see a firm or a company determined to let the public have its wares when it knows they deserve patronage.

THE telegraph key has been the subject of numerous improvements during past years, but the sounder seemed to have attained its final form and last stage, as it has remained practically unchanged for years. Yet we now observe a notable improvement in the latter, which not only makes its action smoother, but considerably reduces the wear on the local battery. Thus we see that even in the oldest electrical appliances improvements can be and are made, as valuable, indeed, as new inventions.

AFTER a separation of years, the meeting of old friends fills the heart with joy. It is with a somewhat similar feeling that we read an article which appears in a contemporary. The latter in a column article gives an interview with a scientist, who is made to describe the various manifestations of magnetism in the ironwork about this city. The article looks very well in its altered dress, but it so happens that it was originally contributed to yet another contemporary by one of our present staff, some eighteen months ago. Still, we suppose an interesting article is always timely, so that our belated contemporary may be excused for publishing it at this late day.

THE cable pool has lowered its press rates to an equality with those of the Commercial Cable Company. In some quarters it is anticipated that this may involve a reduction of revenue. That does not follow, however, and we hear already of one or two press schemes for increased utilization of the cables. The transmission of the news might be better done. What the American reader wants is not a mass of disconnected telegrams that only confuse him, and whose tangled ends he can never gather up or get clear, but something in the shape of a continuous narrative that is at once clear, exhaustive and authoritative. The demand exists, and will soon be met, we think, by the more enterprising papers.

NEWS comes from England that the Trinity House Committee on light house illuminants has just issued the second part of its report, the first part of which has already been given and criticised in these pages. It deals with the apparatus employed in measuring the lights: the effects of the electric currents used; the dynamos by which the currents were furnished; the photometric observations made nightly; the temperature in the lanterns during the experiments, the relative penetrating power of the lights in competition; the cost of the apparatus; the annual duration of fog, and other important details. The system of flashing light upon clouds is condemned as worthless—a point to be noted when the Bartholdi statue is up. The reception of the full report is awaited with interest.

ONE of our gas-light contemporaries refers in a sneering way to the unsteadiness which it observes in the arc lights of one of our large cities, asserting, as a matter of course, that cities contemplating electric street illumination had better think twice before they proceed to such a rash step. As we know that the lamps in the city referred to have been found to work well, the statement, if true, must be traced to a cause other than the lamps proper. It is needless to say that a good carbon is a prime necessity for a good arc light; but the present cutting in prices of this important adjunct begets the fear that the necessary care will not be bestowed upon its manufacture. It is to be hoped that these fears are groundless, as the importance of purity and density in the carbons cannot be too strongly pointed out. No mechanism, however delicate, has been or ever will be devised to produce a steady light where imperfect carbons are employed. Our earnest advice to electric light companies is that they should be ready to pay a fair price for carbons.

IN a recent case which has come to our knowledge, complaint has been made before court that the noise produced by the machines in an electric light station was annoying to neighbors, who asked an interference for the benefit of the public health. We believe that the case is not an isolated one, and believe also that the remedy can be easily applied. It would seem obvious that good foundations for both engines and dynamos are prime necessities for smooth working, yet this fact is completely lost sight of in many installations we have seen. Indeed, in more than one case the vibrations of buildings in which electric light plants are installed, have caused considerable complaint and vexation. The remedy is evident, and only entails a small additional outlay. In contradistinction to the above, we have seen central stations and isolated plants in which hardly a tremor or loud sound was noticeable, with half-a-dozen machines in operation. A little attention to the belts might also lead to considerable reduction of the noise sometimes complained of.

THE popular interest in electricity is evidenced by the pleasure with which the public hears and reads all that it can get on the subject. A good lecturer on electrical themes is listened to eagerly, and it is, therefore, safe to predict success for Mr. Thomas D. Lockwood in his course of lectures on the electric telegraph and telephone, to be delivered before the Lowell Institute, in Boston. We always think that Mr. Lockwood's opinions and statements are worth attention, even when, as is our misfortune sometimes, we do not agree with him; and we know that there are very few men in the profession who have his sound, clear-headed, comprehensive and thorough understanding of the subjects he has selected for treatment. He is likely, too, to discuss the scientific points in a terse and original way that cannot fail to benefit the intelligent and cultured audiences that will be so fortunate as to follow him. Mr. Lockwood's direct logic and forcible eloquence will be heard to advantage on the lecture platform, and we wish some enterprising educational or scientific institute in New York could have the shrewdness and enough appreciation of popular wants to bring him on to this city to repeat the course here.

THE conditions which determine the life of the incandescent lamp have been the subject of much controversy, and the matter naturally calls for investigation, as upon its correct determination much of the success of electric lighting depends. Until quite recently it has been generally supposed that the life of incandescent lamps depended upon the process of manufacture and upon the intensity to which they are forced, but these ideas have now been completely exploded by the investigations of a Frenchman. According to this genius, the life of the lamps is not shortened by the causes heretofore assumed, but is due to an insect. The latter inhabits the carbon in its natural state and remains uninjured during the process of manufacture of the filament. When the lamp is put in operation this "phœnix" roams about and devours the filament in its daily peregrinations, and thus soon causes a collapse of the lamp. But the Frenchman having discovered the cause of the evil, we are astonished that he should have stopped short here without devising a remedy. Why not set traps for these "very tough worms in the little insides" of the poor incandescent lamps? or else find a subtle poison to end this dreadful slaughter of the incandescents. Perhaps a "cut-out" for the insect might also prove efficient, but we leave the choice of methods to those interested.

THIS is the age of invention, especially of electrical invention, and the ease with which new ideas take shape may well challenge the admiration of statisticians and "progressists." As we have already shown in our columns, inventing may be, and to a certain extent has been, reduced to a science so that with a given object in view the final process can be worked out step by step, provided our knowledge of natural laws is sufficient to carry us through. Too much weight, however, cannot be laid upon the desirability and even necessity of knowing what has been done before in any field in which we may be working. This not only advances and calls forth our own ideas, but it shows us what has already been accomplished and where difficulties have been met. Again, it happens not infrequently that an inventor has been directly anticipated, so that his work has been a waste of time, if not of money. Many of our readers will probably have met with this experience, so that a hint as to the proper course to pursue in the future may not be amiss. This advice, it may truly be argued, is well enough for those within the convenient reach of libraries and other sources of information, but what shall those do who are beyond the reach of these? Of course, we can only say that they must submit their ideas or inventions to others having such advantages. This may involve some little expense, but it must undoubtedly be a great saving in the end.

History of the Electric Meter in America—Its Development and Various Forms.

BY F. B. BROCK.

(Continued.)

Nearly all of our prominent electrical inventors have tried their hand either at improving or devising new forms of the electric meter.

Prof. Amos E. Dolbear is no exception to the above statement. Several years ago he turned his attention to the registration of electricity, and produced, as a result, in 1880 an instrument to which he gave the title of electro-dynamometer.

We give an illustration of the Dolbear meter in Fig. 1.

The Professor placed a coil or helix of large copper wire in the line between the electric generator and the point where the force of the current is to be expended, either in producing light, motion, or other work.

The dynamic effect of the current is registered during its flow upon a paper scale moved by clockwork. The Dolbear instrument is mounted upon a circular base which supports a looped frame like a croquet-wicket. From the centre of this frame depends a spiral spring, from which in turn hangs the iron core directly over the central hole of its helix. The helix rests upon the base in an upright position. Near the top of the iron core a pencil is affixed, the point of which is in contact with the graduated strip of paper and marks the variable positions of the suspended core within the helix. The paper is unwound from one spool at one side of the meter and wound up on the other spool at the other side of the meter. These spools are driven by clockwork.

The strip of record paper is divided by marks representing hours or minutes, and may have also a vertical graduation to indicate the force of the current in ampères.

When a current passes through the helix its inductive influence upon its iron core develops magnetism in it, and it is drawn into the coil with a force which is measured directly by the tension upon the spring. The induced magnetism is varied in proportion to the varied strength of the current which traverses the helix.

It is a singular fact that the average inventor and patentee is possessed of very little knowledge of what has been previously accomplished in the same line of invention. We gave an instance of this in Mr. Sawyer's attitude before the Patent Office. In like manner Mr. Joseph R. Finney, of Pittsburgh, asserted that electric meters, as heretofore constructed, have indicated "the strength or dynamic force of the current only," while in the first article we showed that the first patented meter in this country constructed for registering the use of the electric light was merely a *time check* and could not *record* the electro-motive force of the current at all.

Mr. Finney's statement of the progress made in the art

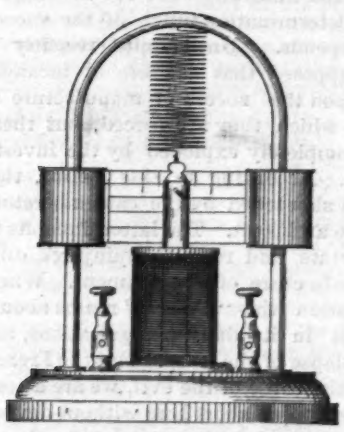


FIG. 1. DOLBEAR'S ELECTRIC METER.

is exactly the reverse of the development which really took place. The duration of the current was first recorded, then the electromotive force, and then the combination in one machine, and not *vice versa*. But, says Mr. Finney, several years after the time a current had been recorded, my object "is to advance a step further in the measurement of the electric current by taking account not only of the force of the current, *but also of the time* during which it is operated." It must be remembered that our remarks on electric meters are confined to their use for registering the consumption of electricity by electric lighting apparatus.

The method employed by Mr. Finney in registering the force and quantity of the current is by applying the operative force of the current to a balance wheel, so that its irregularities or variations from isochronism shall indicate the corresponding variations of the current by means of connected gearing.

In Fig. 2 we give an illustration of the Finney machine. An automatic circuit-breaker is combined with a clock-work gearing having a balance-wheel and dial plates. The automatic circuit-breaker is operated by the current to be measured, and gives a motion to the train of gears more or less rapid, according to the varying force or intensity of the current. The balance wheel checks the otherwise too rapid movement of the circuit-breaker, and the hands and dial plates record the aggregate number of volts.

The balance-wheel and hair-spring control the vibration of the pivotal armature shaft, making it very much slower than it otherwise would be. It will be noted that the control by the balance-wheel is not absolute, but is affecte by the electric current applied to the armature, so that, as the current increases, the balance-wheel vibrates more rapidly, and, as the force of the current diminishes, the balance-wheel vibrates more slowly. The employment of the hair-spring compels the shaft to vibrate with the balance-wheel, though through a shorter arc, and every vibration of the armature causes a ratchet wheel to rotate one tooth, and that more or less rapidly in exact proportion to the intensity of the current. The ratchet wheel is connected with the indicator dials by means of the usual gears.

Mr. Edison's first attempt at the construction of an electric meter is shown in the diagram view, Fig. 3. This he styled a *weber meter*. The manner of registering is analogous to the registration of gas or water flow.

Two plates are suspended in a depositing cell from a balanced arm and insulated from each other. To the balance arm is attached a pendant-weighted lever arm, so that it will

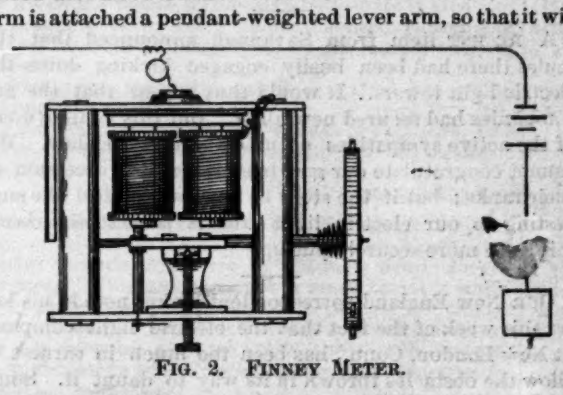


FIG. 2. FINNEY METER.

be tilted by the excess of weight of one plate over the other. The depositing cell is placed in a branch circuit, resistances being so arranged that a definite fraction of the current used shall pass through the apparatus. As the weight of one plate is increased by the deposition of copper from the solution in the cell, it will tip the balanced arm whenever its weight is sufficient to overbalance the adjusted weight on the pendant lever. This latter lever, by its movement, produces a movement of a registering apparatus and a reversal of the current, and the chemical transposition of the copper element from the heavier plate to the lighter one when the same movement, before described takes place, causing another tipping and another registration and reversal.

The amount of current necessary to cause such deposition of metal being known, and it being a definite percentage of the entire current, the registration is made so as to indicate the total amount of current.

The recording mechanism comprises two magnets with their poles oppositely placed, and an armature, common to both, placed between. The vibration of this armature, which is connected with the register, takes place between the open end of a forked piece as shown. The other end of this fork operates a reverser. There is a circuit connection from one member of the circuit to the forked piece, while the weighted lever arm is connected to the other member. A very large resistance is placed in this circuit, so that only enough current passes to operate an ordinary electro-magnet. Around each magnet is a short circuit of large resistance to relieve them from the effects of extra or induced currents.

(TO BE CONTINUED.)

The Daft Electric Motor in Baltimore.

Mr. Robert L. Harris has lately given an account at a meeting of the American Society of Civil Engineers on the working at Baltimore of the Daft electric motor, now being tested on the Ninth avenue line of the New York Elevated Railroad.

The Baltimore & Hampden Railroad is a suburban line of about two miles in length; gauge, 5 feet 4½ inches. It was heretofore an old horse railroad, and is a feeder to a main line of the Baltimore horse railroads. It is now operated by the Daft motors. This road has iron rails, 25 pounds per yard, laid on cross-ties in a cheap manner, and runs along the side of suburban streets or roads. The country is undulating and the route is crooked. Its curves are from 40 feet to 90 feet radius, and the grades are from level to the rate of 330 feet per mile. The superintendent, Mr. T. C. Robbins, says there are only about 300 feet of continuous level on the route, and very little level on its entire distance. A 25-pound steel rail has been placed on insulators near the middle of the ties as conductor, and was roughly guarded by joists and planks laid on each side of it. The reason for using 25-pound rails as conductors was simply that in case of failure they would be useful for repairs. It was unnecessarily large for a conductor. Electricity has been used upon the road in place of horses since September 1, 1885. The sections of conducting-rail, as also of the track rails, are electrically connected by wires. In some places these wires are not insulated, and the rails were connected by a mere loop of ¼-inch copper wire. The connections at main dynamo are of ½-inch copper wire insulated. At the engine-house there is a boiler, two doors to the fire-box, 14 feet long, 5 feet diameter, with 60 3½-inch flues. The engine is 16 × 24-inch cylinder, which, with 80 pounds of steam at 110 revolutions per minute, is said to develop about 75 horse-power. This engine drives two nominal 50 horse-power Daft dynamos, which supply the electric current to the rail. The engineer said that when both motors, each with a loaded car attached, were ascending the steepest hills, the full capacity of his engine was used, but when neither were on a hill not 10 horse-power was used. This engine uses about 1½ tons of coal per day of 18 hours, with fires banked at night. Two motors are in use, each weighing about 4,500 pounds and rated at 10 horse-power. A new motor, weighing about 5,000 pounds and rated at 20 horse-power, has just arrived, and was connected with the current and moved about. The motion of the armatures was stated as about 1,200 revolutions per minute; they were geared to the driving-axle of the motor by ordinary tooth-geared wheels in the proportion of 12 to 1, and the speed of the motor arranged for 12 miles an hour. But one strength of current has thus far been used, of low intensity; there has been no occasion for other powers of current. No electric brake is being used.

We rode, said Mr. Harris, on a regular trip to the end of the road and back with a street car attached, such as is ordinarily used with two horses. The average load was about 18 passengers. We went around one curve of 40 feet radius on a grade of 275 feet per mile, and around a curve of 70 feet radius on a grade of 330 feet per mile. While we were ascending a grade of about 320 feet per mile, the other motor was said to be at the same time ascending a similar grade. We stopped near the middle of this grade and started from full stop without difficulty. The toothed gearing made some noise, but passing horses did not seem frightened. It is expected to avoid toothed gearing by friction gear. The motors are controlled by one man, and, with car attached, start from each terminus about once an hour, and pass each other by side track. Mr. Robbins told me that the Morse has run 1,006 miles with no repairs (except oiling). Its average duty is 75 miles per day. No especial skill is needed; he had at times run his motors with men taken right off the road. He is satisfied with this power, and hopes that his company will soon use it on the other 6 miles of suburban road which they own. His company own also 14 miles of Baltimore city horse railroads. He considers that his present power would run on his road five motors, each carrying one car, and, were there but 150-foot grades on his road, his present power would run five motors with three cars each. As now run the two motors take the place of 30 horses and are as cheap, and were he running eight cars there would

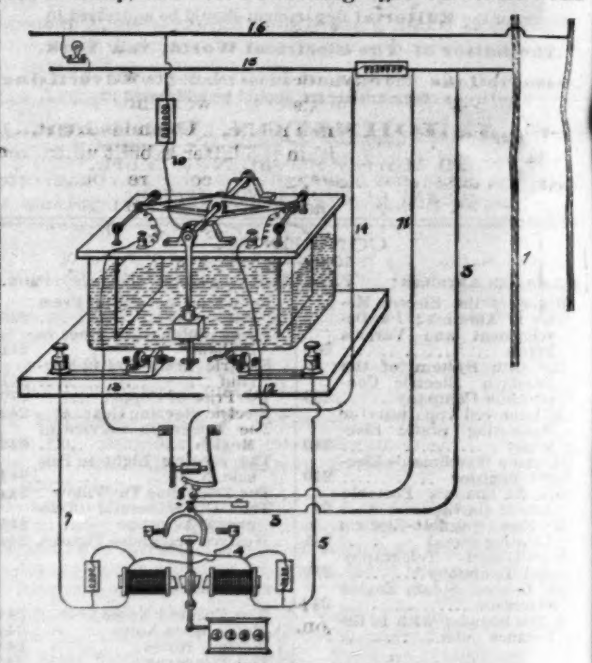


FIG. 3. EDISON WEBER METER.

be a saving of one-half the cost of horses for the same duty. There has been no trouble in heavy rain and thunder storms; he thinks it works better in wet weather, and has even known the flange of the conducting rail to be in water for a short distance during a rain storm. He says two of the men that have run the motors were locomotive engineers, and their expression was, "It lays away over steam." In fact, he thinks steam would not, with such light engines, carry such loads up such grades as has been done by the motors. Mr. Robbins states that he had had no troubles other than mechanical, which are now remedied (the armatures and brushes were at first too light).

As a test for himself, Mr. Robbins once sent to the city for one of their heaviest cars	lbs.	5,100
And carried a load of 81 persons over the road (say 81 × 125 pounds)	lbs.	10,125
The weight of the motor used was	lbs.	4,500
Total	lbs.	19,725
Thus he says that 19,725 pounds were carried over the road by one motor of	lbs.	4,500
His engine and boiler cost, approximately		$2,400
His two motors cost, approximately, $3,000 each		6,000
Total		$8,400

There is also the expense of conducting rails and wires, insulation, protection, etc.

His expense of running per day is 1½ tons of soft coal	$4.75
Engineer and fireman at power station	4.50
Or, excepting oil, waste, wear and tear, per day	$9.25

The above represents the cost of his power, and equals the work of 30 horses per day. The average receipts from the cars carried by the two motors are $18 per day, and he has taken (on a Sunday) total receipts of $86 in one day.

The Arc System of the Brooklyn Electric Construction Company.

Notwithstanding the prophecy heard some time ago that the arc light would soon succumb to the incandescent, it is apparent that the former has not only stood its ground well, but is decidedly on the increase, like the incandescent lamp itself. This goes to prove that, as we have often stated, each has its own particular field which it will continue to occupy until some better method of illumination is devised. That the field is a large and open one is shown by the increasing number of builders of lighting apparatus, among the more recent of whom is the Brooklyn Electric Construction Company, whose apparatus we propose to describe.

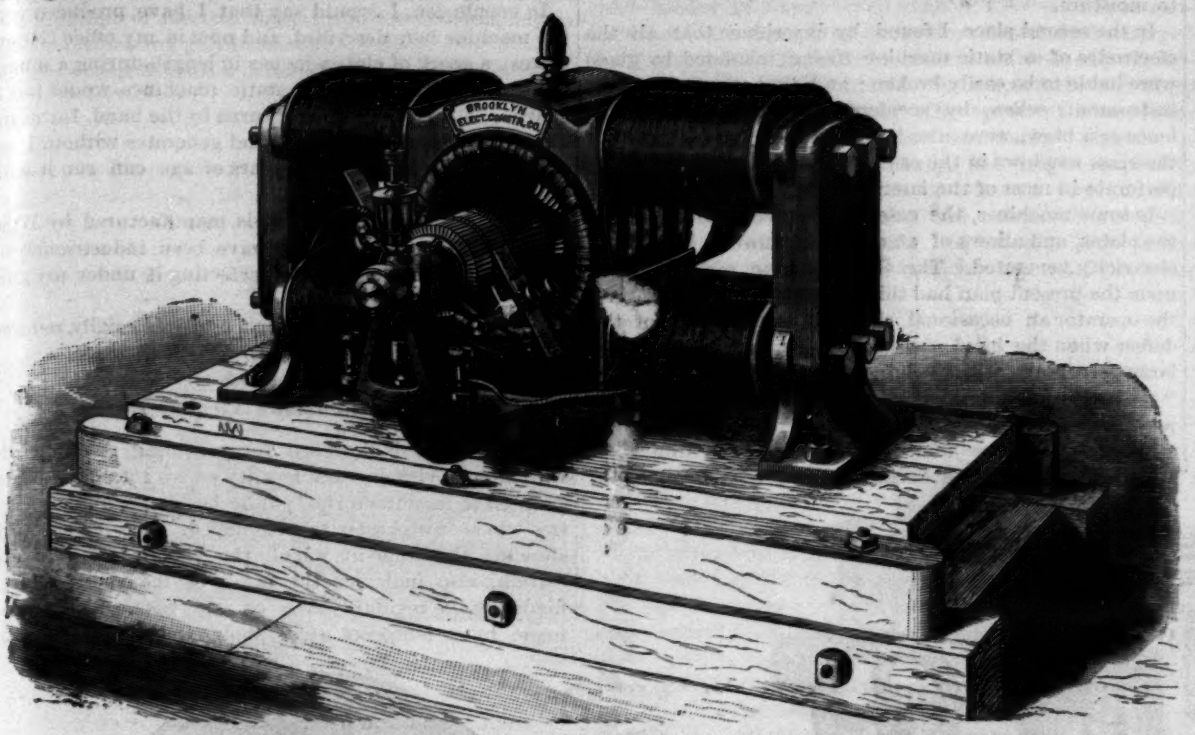


FIG. 1.—DYNAMO OF BROOKLYN ELECIRIC CONSTRUCTION COMPANY.

Beginning with the dynamo, which is shown in Fig. 1, it will be seen that it consists of the well-known form of field magnets between which rotates a Gramme armature, *Fig.* 2. The iron ring within the latter is built up in ten sections of laminated sheets, and the coils are wound separately on each section. The sections are then bolted to the internal spider and form a continuous ring. Thus, in case of repair requiring a renewal of the coils, any one of them can be removed and replaced without interfering with the others.

The commutator or collector has a groove turned midway in its circumference, and each brush touches an independent bearing. The brushes h[illegible] a trifle narrower than the bearing point, it follows th[illegible]e commutator is worn down evenly, and no grooves or [illegible]uts can be formed, which otherwise necessitates filing and sometimes a re-turning of the commutator. There being in addition two brush-holders on each side of the commutator, a new pair of brushes can be inserted at any time while the machine is running without stopping the current. The machine is "series wound," and all provisions have been made for insulation and lubricati[illegible]

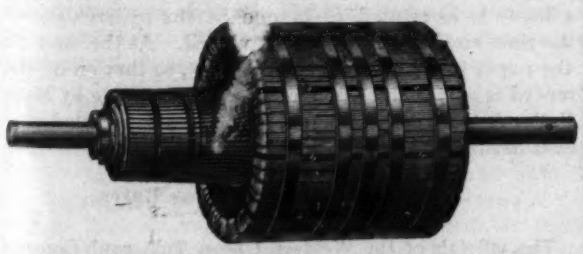


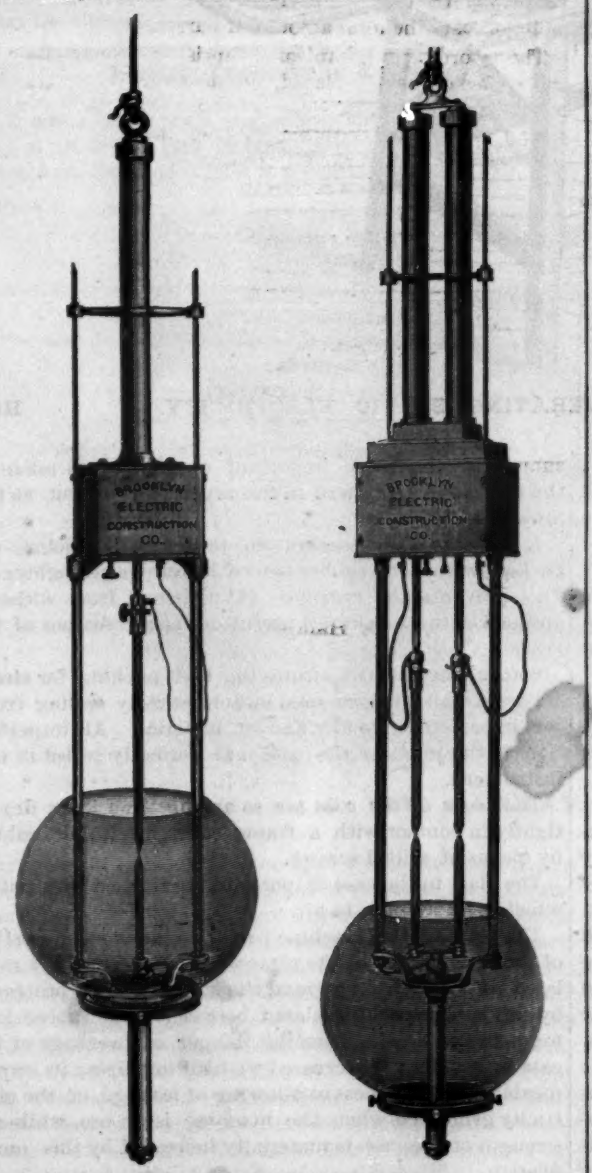
FIG. 2.—ARMATURE.

The single and double lamps forming a part of the system are shown in Figs. 3 and 4. and their mechanism is extremely simple, affording a steady light, as we had occasion to witness recently. The mechanism is of the "clock-work" type, the carbon rod having a rack which gears with a pinion. The lamp is of the "derived circuit" pattern, there being a main and a shunt magnet. The current entering the lamp energizes the main magnet, which attracts its armature and raises the carbon rod, holding it permanently fixed. When the arc becomes too long and increases the resistance, a sufficient current passes through the high-resistance magnet so that the latter attracts its armature. This movement allows one tooth of an escapement wheel to pass, and feeds the carbon $\frac{1}{100}$th of an inch. At the same time, however, the rising armature breaks the shunt circuit, and it falls back to its original position, ready for the next impulse. It will thus be seen that the main magnet armature is always attracted, and keeps the rod fixed in position, while the shunt magnet and armature perform the necessary feeding. The length of the arc and of feed can be regulated to any quantity, and the action of the feed throughout depends entirely upon gravity, no spring whatever being employed in the lamp. A very simple cut-out is used, and the tripping arrangement in the double lamp is very simple and efficient.

For the purpose of indicating the normal working of the system the indicator shown in Fig. 5 has been designed. It consists of a few turns of wire spaced, within which a magnetic needle is pivoted vertically. The strength of the current is thus indicated, and any deviation from the normal causes an alarm to sound. The system includes a number of other devices, among them an automatic regulator, but lack of space prevents us from entering upon them more fully.

A noteworthy fact in connection with the construction of the dynamos is that the parts are made interchangeable. All the armatures are 12 inches in diameter and vary only in length.

We may add that the city of Lynchburg, Va., is now



FIGS. 3 AND 4.—ARC LAMPS.

lighted by 140 lamps of this company from a station situated four miles distant. The James River at this point having a fall of 16 feet is being used as a motive power by means of two "Victor" turbines. The lamps in the city are fed by circuits, one 16 miles and two 13 miles in length. This plant is giving very satisfactory results.

The electrician of this company, Mr. E. R. Knowles, since his connection with this company has reconstructed the whole system, introducing numerous new devices and rendering the same practical and efficient, and much credit is due to his knowledge as an electrical engineer of the wants of a good system of electric lighting.

The First Transmission of Power by Electricity.

At the present time the idea of using two dynamo machines placed at a considerable distance for the transmission of power is so well known as to cause no more surprise than the transmission of the power of a steam engine to the various machines in a factory by means of shafts, belts or ropes. At the generating station we have a dynamo driven by some prime mover; we have then two insulated wires leading to the point where the power is required, and there we recover part of the energy of the prime mover by means of a second dynamo machine acting as electro-motor. All this is well known, and is now accepted as an established fact, which is as simple and self-evident as the law of gravitation. But there was a time when even this simple and familiar application of electricity was shrouded in mystery, and a *bonâ fide* invention or discovery was necessary to bring it to life.

It is always interesting to go back to the first dawn of a new invention, but it is not always easy to determine whether it was the result of accident, necessity or the outcome of clear, intelligent foresight on the part of the inventor who was working for a particular purpose. As regards the first transmission of power by electricity, opinions are divided. According to M. Figuier, accident, pure and simple, was the cause of the discovery. He relates that at the International Exhibition in Vienna, in 1873, the Gramme Company had two machines on view, intended for lighting purposes. One of these machines was in motion, and a workman who noticed that some cables were trailing on the ground, and thinking they belonged to the second machine, placed them in its terminals. To the surprise of everybody this second machine, which had been standing, began to turn of its own accord. Then it was discovered that the first machine was working the second.

This story is romantic, but disappointing to a true lover of science, who would prefer to believe that a great discovery was the logical outcome of the working of a powerful intellect, and not the result of accidental meddling on the part of an ignorant workman. But there is another version of the story, told by M. Hippolyte Fontaine to the Société des Ancients Elèves des Ecoles Nationales d'Arts et Métiers a few months ago. M. Fontaine claims to have actually invented or discovered the electrical transmission of power, as will be seen from the following short abstract of his paper read before the above mentioned society:

"On the 1st of May, 1873—that is, on the date fixed four years previously by imperial decree—the Exhibition in Vienna was formally opened. At that time the machinery hall was yet incomplete, and remained closed to the public

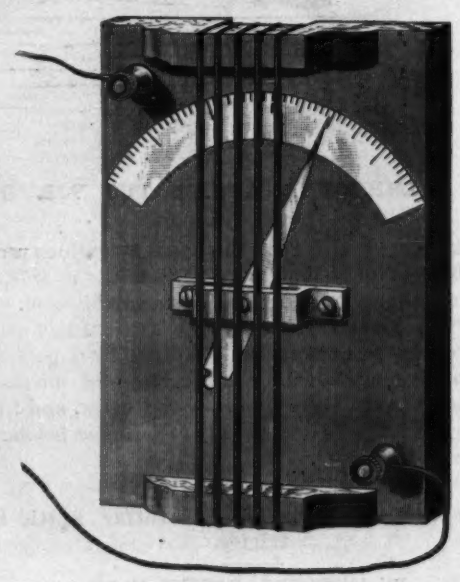


FIG. 5.—CURRENT INDICATOR.

until the 3d of June, when it was also thrown open. I was then engaged with the arrangement of a series of exhibits, shown for the first time in public, which were intended to work together, or separately, as desired. There was a dynamo machine by Gramme for electroplating, giving a current of 400 ampères at 25 volts, a magneto machine, which I intended to work as a motor from a primary battery, or from a Planté accumulator, to demonstrate the reversibility of the Gramme dynamo. There were also a steam engine of my invention heated by coke, a domestic motor of the same type heated by gas, a centrifugal pump placed on a large reservoir, and arranged to feed an artificial cascade, and numerous other exhibits. To vary the experiments I proposed to show, I had arranged the pump in such a way that it could be worked either by the Gramme magneto machine or by the steam engines (Fontaine).

"On the 1st of June it was announced that the machinery hall would be formally opened by the Emperor at 10 A. M. on the day after the morrow. Nothing was then in readiness, but those who have been in similar situations know how much can be got into order in the space of 48 hours just before the opening of a great exhibition. In every department members of the staff with an army of

workmen under their orders were busy clearing away packing cases and decorating the spaces alloted to the different nations. These gentlemen visited all the exhibits in order to determine which of them should be selected for the special notice of the Emperor, so as to detain him as long as possible among the exhibitors of their respective countries.

"M. Roullex-Duggage, who superintended the work in the French section, asked me to set in motion all the machinery on my stand, and especially the two Gramme machines. I set about at once, and on the 2d of June I had the satisfaction of getting the large Gramme dynamo, the two engines (Fontaine), and the centrifugal pump to work; but I failed to get the motor into action from the primary or secondary battery. This was a great disappointment, especially as it prevented my showing the reversibility of the Gramme machine. I was puzzled the whole of the evening and the whole of the night to find a means to accomplish my object, and it was only in the morning of the 3d of June, a few hours before the visit of the Emperor, that the idea struck me to work the small machine by means of a derived circuit of the large machine. Since I had no leads for that purpose, I applied to the representative of Messrs. Manhis, of Lyons, who was kind enough to lend me 250 metres of cable, and when I saw that the magneto machine was not only set in motion, but developed so much power as to throw the water from the pump beyond the reservoir, I added more cable until the flow of water became normal. The total length of cable in circuit was then over two kilometres. This great length gave me the idea that by the employment of two Gramme machines it would be possible to transmit mechanical energy to great distances. I spoke of this idea to various people, and I published it in the *Revue Industrielle* in 1873, and subsequently in my book on the Vienna Exhibition. The publicity thus given to it was so great that I had neither time nor desire to protect my invention by a patent. I must also mention that M. Gramme has told me that he had already worked one dynamo by the other, and I have always held that the honor of my experiment belongs to the Gramme Company."

An Improved Apparatus for Generating Static Electricity.

BY AMBROSE L. RANNEY, M. D.

I would call the attention of the profession to an improved static machine which has been lately devised by me.

It is the result of many months of experimentation, and is the outgrowth of the dissatisfaction which all other devices for generating electricity by friction have afforded myself as well as others who have employed them. By those who have had experience with static machines it is generally conceded that they are frequently charged with difficulty and give but a feeble spark during damp weather; and that they are particularly unsatisfactory and of little service during the summer months, when such conditions are liable to prevail. It is also conceded that some form of motor is generally required to run a machine of large size, because the hand is soon fatigued in overcoming the friction of the plates upon the rubbers in addition to that produced by the bearings of the axle, and the belt which connects the driving-wheel with the axle. Furthermore, it is now well recognized that plates of large size (16 to 24 inches in diameter), and several of them are absolutely essential to a machine which is intended for medical use. Small single-plate machines do not give sufficient quantity or length of spark to be of any practical benefit as a curative agent. Again, it has been found by experience that building a glass case over a static machine does not thoroughly protect the plates of the instrument from dampness. No cabine.maker can make joints of wood which will not admit of much moisture when the outside air is impregnated with it; and chloride of calcium, if placed within the case, will not absorb all the dampness that enters and collects upon the plates and metal of the machine.

For a long time I was in the habit of burning an alcohol lamp of large size within the case of my own machine during damp weather to obviate this serious objection; but to insert and withdraw the lamp the doors of the case had to be opened, and the plates were thus unduly exposed to moisture.

In the second place, I found by experience that all the electrodes of a static machine (being insulated by glass) were liable to be easily broken; and that the poles of the instrument, when, by accident, exposed to outside violence or a blow, were also liable to cause a breakage of the glass windows in the case of the machine, which they perforate in most of the later models.

In some machines, the case is moreover too small for the plates, and allows of an escape of more or less of the electricity generated. The first machine which I made upon the present plan had this objection. It would give the operator an occasional shock in consequence of this defect when the hand was used as a motor, and it lost a large percentage of the volume of electricity generated by "grounding" that proportion which jumped to the metal parts of the case.

Without entering further into numerous difficulties which I have had to encounter and overcome, I may summarize the more important improvements made in the machine shown here in the accompanying cut, as follows:

1. The case is so constructed that all of its joints are packed with soft rubber before its screws are tightened. This prevents the entrance of moisture from without, and makes the machine a useful one at all seasons of the year.

Soft rubber now constitutes the best packing for steam apparatus, and is also used in hermetically sealing fruit-jars in preference to any known material. All imperfections in the joints of the case are perfectly sealed in this instrument.

The *doors of the case* are so arranged as to be drawn tightly in contact with a frame covered with soft rubber by means of milled screws.

The glass in the case is put into the frames with putty, which is impervious to air.

The poles of the machine perforate the wooden portion of the case instead of the glass windows. They are insulated with hard rubber, and the apertures are protected by soft rubber packing placed between hard rubber buttons and the wood. Thus the danger of breakage of the case by accident is decreased without impairing its impermeability to dampness or allowing of leakage of the electricity generated when the machine is in use, while the strength of the case is materially increased by this modification.

2. The axle is so built as to reduce the friction to a minimum and to allow of its being oiled without opening the case.

3. The driving wheel is very large and rests upon a cast-iron support. This insures both ease of motion and durability.

4. The glass plates of the machine are nine in number. Six of these revolve and three are stationary. The stationary plates are of peculiar shape. The revolving wheels are made of carefully selected glass, so as to be as true as possible and bear evenly upon the rubbers as they revolve.

5. The excitants consist of cat-skin rubbers between the inner plates and metal buttons upon the outer plates, which touch as they revolve upon fixed metal brushes.

6. The collectors have tinsel attachments which aid in gathering the electricity generated.

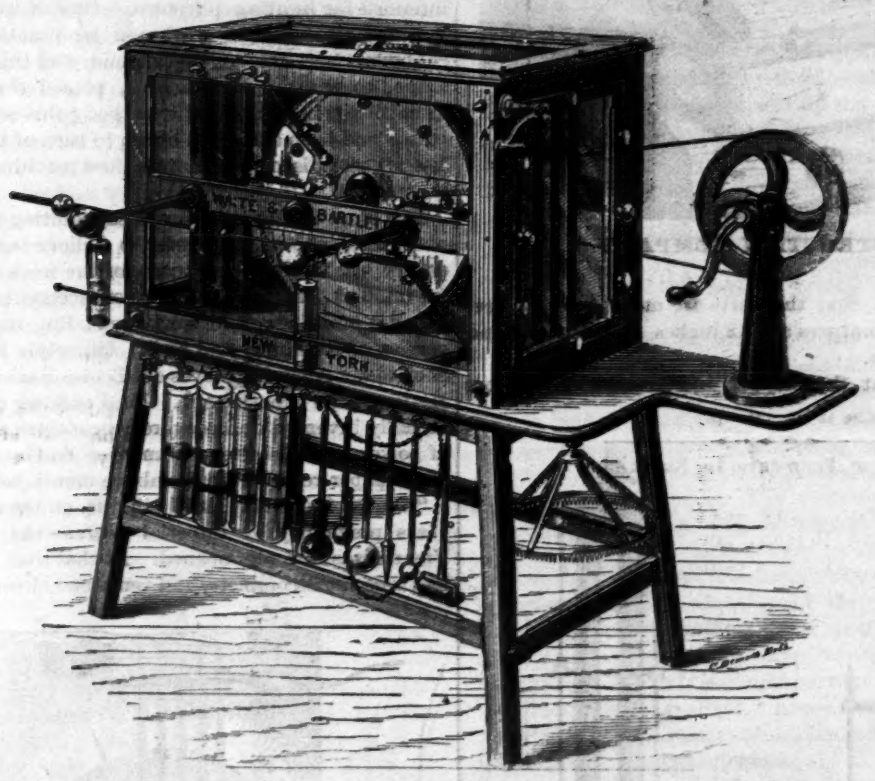
7. The electrodes are made with handles composed of hard rubber instead of glass. They are, therefore, less liable to be broken and are as perfectly insulated.

8. Each machine is provided with three pairs of Leyden jars of different sizes. It is arranged also with hooks upon which the electrodes may be hung when not in use.

In conclusion, I would say that I have produced with the machine here described, and now in my office (24-inch plates), a spark of eleven inches in length during a muggy day in August, when most static machines would fail to charge. It runs, after a few turns by the hand, for nearly a minute without any power, and generates without interruption. Any boy of seven years of age can run it without fatigue for half an hour.

The machine here described is manufactured by Waite & Bartlett, of this city, who have been industriously occupied for several months in perfecting it under my guidance.

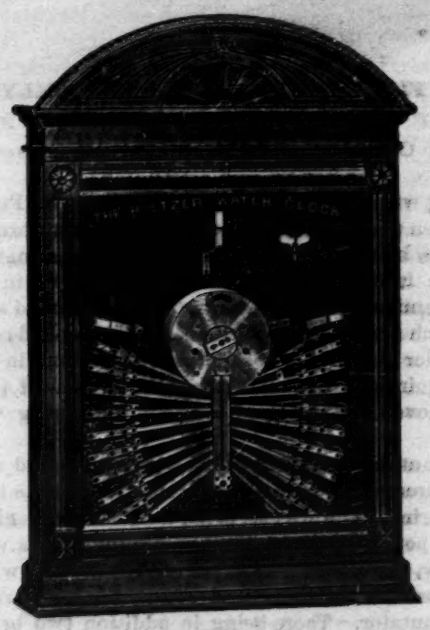
The cost of this machine has been materially reduced, rather than increased by the improvements made.



IMPROVED APPARATUS FOR GENERATING STATIC ELECTRICITY.

Holtzer's Watchman's Electric Register.

This register is designed for recording the time of a watchman's visit to each locality on his route. It is wel adapted to manufactories, public buildings, and all localities where watchmen are employed. The record, while showing the time at which the visit is made to each station, also indicates the order of the visits, whether made by the regular course or otherwise. The record is made by a tempered steel point and the markers are actuated by an electro magnet, and in each room to be visited is an electric press knob. Upon the watchman pressing this knob, the armature is attracted, which causes a dot to be imprinted upon one of the squares, showing the time and station which is visited. At the same time the paper is punctured at each mark, so that an indelible record is obtained. The clock, which is made by Messrs. Fuller & Holtzer, of Boston, Mass., can be situated wherever desired.



HOLTZER'S WATCHMAN'S ELECTRIC REGISTER.

Reduction on Cable Press Rates.

The officials of the Western Union Telegraph Company in this city received notice from London on Dec. 3 through General Manager Weaver, representing the four Atlantic cable companies in the old pool, informing the Western Union of a reduction in the rate of press messages by cable. Ordinary press matter will hereafter be transmitted by the pool lines for twenty cents per word, instead of twenty-five, as heretofore, and deferred press messages for ten cents, instead of twelve and a half.

The new press rates are the same as the Commercial Cable Company has been charging ever since it was opened. When this line entered the field with its quick service at forty cents a word for ordinary commercial business the old lines were compelled to reduce from fifty cents. The pool, however, never until yesterday made any reduction in its press rates. When asked why the press rates of the new company had not been met before an official of the Western Union company said that he supposed it was "merely an inadvertence."

General Manager Ward, of the Commercial Cable Company, laughed when told of this. "There was no inadvertence about it," he said. "The old companies designedly kept up the old press rate, knowing that we, a our lower prices, would in consequence get all the press patronage. They thought this rush of business would be too much for a new company, and cripple and delay us

handling commercial business, which, of course, is at higher rates and more profitable. The old lines have united nearly a year in this amiable hope that we 'couldn't stand the press,' as it were, and they have been disappointed, and have given up the fight. We handle our press business very easily."

Dr. Edelmann's Portable Astatic Galvanometer.

In many operations, such as the testing of lines, resistances by means of the Wheatstone bridge, etc., especially in those which are based on a zero method, a portable apparatus is often desirable and necessary. While in the laboratory a mirror galvanometer would always be used, the telegraph or electric light inspector instinctively applies an indicating galvanometer.

A fibre suspension is a prime requisite for a sensitive galvanometer, and this very point makes it difficult to construct a sensitive portable testing instrument. Dr. Edelmann has nevertheless devised a portable instrument which possesses the desired delicacy by having the needle suspended from a silk fibre.

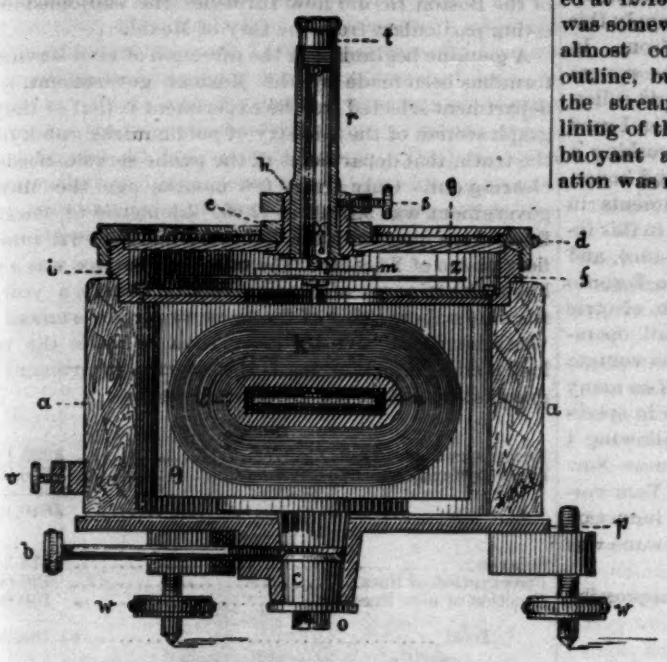


FIG. 1.—ASTATIC GALVANOMETER.

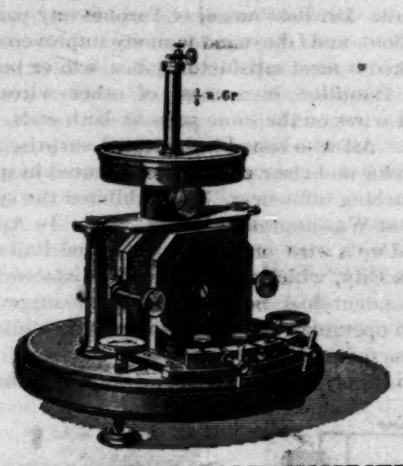


FIG. 2.—DIFFERENTIAL GALVANOMETER.

The accompanying illustration, Fig. 1, shows a section of the instrument as it is constructed by Hartmann & Braun, of Frankfort, Germany. The two needles constituting the astatic combination are shown at *m* and *n*. The latter swings within a copper damper *l* and the coils *k*, and is connected to the upper magnet *m*, which is provided with an aluminium pointer *z*, which travels over a circular scale *f*. The connection between the upper and lower magnet is made by a small rod which swings freely between the two galvanometer coils.

The coils and damper are placed within a cylindrical wooden box *a*, which carries two binding screws, the whole being mounted so as to rotate on a conical bearing.

The dial plate can be graduated according to current strength (1 division = 0.000001 ampère) or in degrees, as desired.

The needle can be easily removed by drawing it out through the space between the divided coils.

The instrument shown in Fig. 2, made by the same firm, for which Messrs. Queen & Co. are agents, represents a differential dead beat galvanometer of new design.

Firing Submarine Mines in England.

The London *Times* gives particulars of some important experiments carried out on the torpedo ground outside Portsmouth Harbor in the Solent. Within the area of the torpedo field situated opposite the sea fronts of Forts Monckton and Gilkicker, near Portsmouth, an important experiment in submarine mining was carried out by Captain Markham and Commander Robinson, of the "Vernon," on the part of the Royal Navy, and by Major Bucknill and Captain Wrottesley, on the part of the Royal Engineers. At each corner of a quadrilateral was sunk a heavy mine consisting of 500 pounds of gun-cotton inclosed in wrought-iron cylinders, all four being in separate electrical connection with a battery on shore. The distances of the mines apart were the same as is usually observed in the navy as being within effective destructive range. At various known distances from the charged mines were submerged a great number of cases of various construction loaded down with dummy guncotton as target mines, and the object of the experiment was to ascertain the effect upon the different structures of exploding heavily charged submarine mines in their neighborhood. Twelve of the targets consisted of simple royal engineer mines, lined with plaster-of-paris and cement, also of electro-contact mines. The targets also included naval countermines, fixed mines and electro-contact mines, service and experimental. Among others were samples of the ingenious mechanical fixed torpedo invented by Lieut. Ottley, late of the Vernon, which sinks to a predetermined depth on being thrown overboard, and a solitary example of the mines which were manufactured in England for the use of the Chinese government on the commencement of hostilities with France. This differs from the service pattern in form and material, being constructed of cast iron instead of wrought iron, and semicircular or umbrella-shaped in section instead of cylindrical or spherical. The various mines were all fixed buoyantly, and were destitute of blowing-up charges, as the purpose in view was not to discover whether the explosion of the heavy mines would detonate those in their midst, but to learn the comparative effects of the concussion on the containing vessels and gear, the force of the explosives at different ranges being measured by crusher gauges. Such heavy charges of gun-cotton, amounting in the aggregate to 2,000 pounds, and having an energy equal to about 8,000 pounds of gunpowder, had not previously been simultaneously discharged at Portsmouth. The charges were simultaneously exploded at 12:15 on a half-ebb tide. As a spectacle the effect was somewhat disappointing. The spouts of water were almost connected and were extremely jagged in outline, but they did not rise to the height expected, the stream of mud which overflowed the interior lining of the jets showing that the mines were scarcely buoyant at the time of the explosion. The detonation was not unpleasant on shore, but the radial extension of the disturbance must have been effective, as fish were stunned at considerable distances out to sea. The results of the experiment cannot yet be known, but it is believed that the Chinese mine is broken up.

Electric Tramcars in England

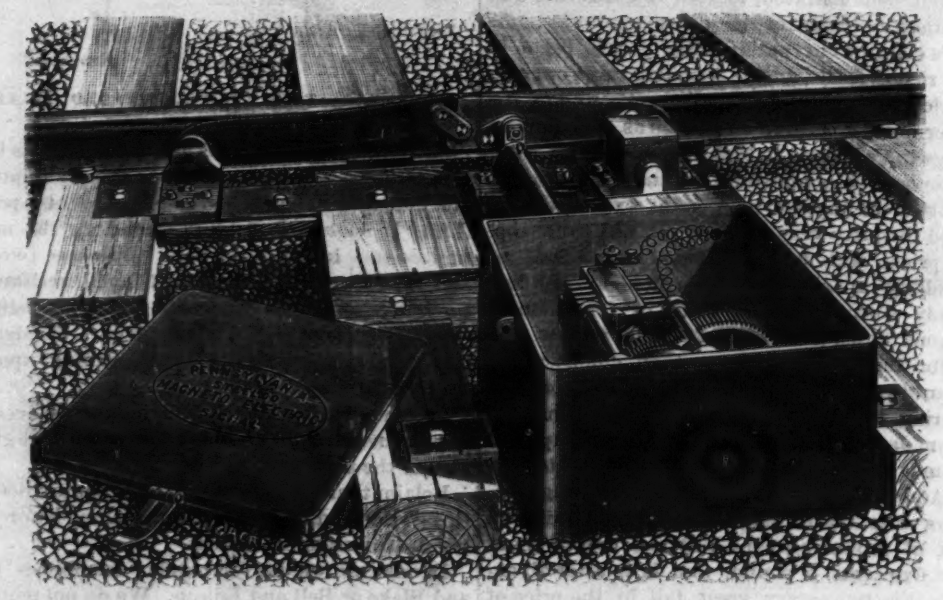
A new electric tram engine was shown recently at the depot of the North Metropolitan Tramway Company, Stratford, England. This is a centre at which fair trials have always been readily accorded to any new motor, and it is understood that in the event of the new inventors and the Tramway Company agreeing upon terms, a practical experiment of no small importance will be made in electric tramway working upon the new line to Ilford. The electrical engineers in this case are the Electric Locomotive and Power Company (Limited), who claim to have solved the problem of economical working by combining the electrical power with the mechanical aid of the lever principle. The electro-motor is connected by pinions horizontally with a large stationary rack and vertically with the wheels. When the motor is started the pinion of the horizontal armature gears into the stationary rack, and so causes the motor itself to revolve. The motor then becomes by the action of its fixed vertical shaft the driving axle, and communicates its motion to the wheels of the car. By means of clutches a backward or forward motion can be secured without reversing the direction in which the electro-motor is revolving. The electricity is supplied from 50 cells of about a total of 280 ampère hours. It is claimed that the average discharge is from 40 to 45 ampères per hour, and that an engine consuming only two tons of coal per week will charge batteries sufficient to do the work of four cars requiring at present 44 horses per week. The motor appears to be controlled with perfect ease, and though at present it is fitted up separately from the car itself, so as to take the place of horses and utilize existing cars, the company claim that it can in future easily be constructed as a part of the passenger cars.

A New Magneto-Electric Crossing Signal.

A new application of electricity to railroad signaling has recently been made by the Pennsylvania Steel Company, of Steelton, Pa., in the apparatus illustrated herewith, for sounding an automatic alarm at highway crossings on the approach of trains, or for announcing trains at stations. It is intended to act as a substitute for gates and flagmen at many less important crossings, and to "guard the guards themselves" at crossings where they are employed, by giving both the flagman and the public timely warning.

The accompanying illustration shows the arrangement used on a single-track railroad, which is so arranged as to be operated only by trains *approaching* the crossing (*i. e.*, in the form illustrated, from the right). A similar box on the other side of the crossing is used for trains approaching in the other direction. Two plates, connected by a link and pivoted, are placed alongside of one rail, close enough to be depressed by the treads of the wheels. By another link one of the plates, called the rock plate (the one to the right), is connected to a rock shaft, which extends through a strong bearing into the heavy iron case or box shown, at a suitable distance from the rail, within which the electric generator is placed; the whole being mounted and secured upon the ends of two long ties framed to receive it.

The action of this rock plate is peculiar. It is pivoted at the rear end, not to a fixed point, but to a short crank-arm, the bearing for which is inclosed in the small box shown. As the first wheel of a train which is approaching in the desired direction (from the right in the engraving) touches it, it will be seen that it must not only depress it, but produce a slight forward motion, causing a corresponding rotary motion in the rock shaft which actuates the apparatus. On the other hand, when a train is approaching from the other direction, or has already passed the crossing, its wheels strike first the curved plate to the left of the illustration, and by means of the peculiar link connections shown depress the rock plate so as to clear the wheels before the wheels touch it; but the depression is directly vertical, so that it does not give any horizontal motion to it which would have the effect of actuating the rock shaft. Consequently, trains pass over the apparatus in one direction without having any effect upon it whatever, the different point at which the same force is applied to the rock plate giving the latter an entirely different motion.



A NEW RAILWAY CROSSING SIGNAL.

The slight rotary motion which is in this way communicated to the rock shaft, when a train is approaching in the right direction, compresses a spring inside the case. As each wheel passes off the rock plate, the reaction of the spring throws it up again to its former position, giving additional speed to the gearing within, which is set in motion at the passage of the first wheel, and operates the magneto generator. A small but heavy fly-wheel is connected with the apparatus, the top of which is just visible in the engraving, which serves to store up power to run the generator for the necessary number of seconds after the rear of the train has passed. The dynamo dispenses with all need for batteries, and reduces the work of maintenance to occasionally refilling the oil-cups and noticing if any part has been broken.

A suitable wire circuit is provided, commencing at the generator with insulated and protected wire, and continued with ordinary telegraph wire, leading to an electric gong, which rings as long as the armature revolves. It is a simple matter so to proportion the mechanism for the required distance and speed that the revolutions of the armature and the ringing of the gong shall continue until the train reaches the crossing, and as each wheel acts

upon the apparatus, the more wheels there are in the train the longer the bell will ring—a very convenient property, since the slowest trains have nearly always the most wheels. The practical limit to the ringing of the gong is that it will stop sounding after the head of the train has passed the crossing or before the rear has passed.

The Price of Copper.

Owing, no doubt, to the all-absorbing interest in the silver question and the depreciation in the price of this second precious metal, the great fall in the value of copper has been seemingly entirely overlooked. When silver was selling at 61d. per ounce and lead for £18 a ton, copper was selling at between £100 and £105 per ton. Since then silver has gone down to 47d. per ounce, a depreciation of 23 per cent. Lead is now selling at £12 per ton, which is a depreciation of 33⅓ per cent., while copper is selling in London (Chili bars) at £42 a ton, which is say 58 per cent., or, in other words, 8 per cent. less than half its former price. And, in fact, a few weeks ago it actually sold in London for £39 a ton, the lowest price known, says the New York *Times*, not only to living men, but in the history of metal values. Strange enough, while there are good reasons for the depreciation in the price of silver and lead, there is less good reason for this enormous fall in the price of copper. Silver has depreciated because, first, there is more silver now produced in value annually than gold; second, the Latin Union has since 1876 stopped coining silver; third, Germany, Scandinavia, Holland and other countries have gone over to the one single standard of gold, and have some four or five hundred million dollars of silver to sell; and lastly, which is of the greatest importance, India, owing to the immense investments of English capital in building railroads and other public works in that country, instead of taking $100,000,000 silver annually from England to adjust the balance of trade, has instead to pay England $100,000,000 a year for interest on the invested capital. Now, these are reasons enough for silver to be depreciated; yet it has, after all, only gone down some twenty-three per cent. Lead has just depreciated one-third in value because immense quantities are produced as the by-product of silver, which, in addition to the former production, is a good reason for its fall. But copper depreciating considerably more than to half its former price is the strangest anomaly in the history, not only of metals, but of commerce in general.

Until within a few years the principal supply of copper for the whole world came from Chili, Spain, Australia, Africa and Lake Superior. Of course there was always more or less copper produced in other countries, but the above named were the countries that supplied the bulk. About five or six years ago some signs of new copper fields were pretty well demonstrated, located in California and Arizona, Montana and some of the other territories. As is usual in this country our enterprising people began to develop these rich deposits, and as in ninety cases out of a hundred the richest deposits are usually pretty well on the surface, copper mining became as prolific as the famous placer diggings in California in 1849 and 1850. The additional immense quantities mined in Arizona, Montana and California glutted the market to a great extent, and of course reduced the price very largely, yet, although copper fell in price, still within a year and a half or so it was selling at about £60 per ton in London, and it is only within the last three or four months that it has gone down as low as £39, and is now £42. The reason for this seems to have been chiefly in the enormous quantities of copper shipped to Europe from this country. During the first nine months of the present year, viz., from Jan. 1 to Sept. 30, this country exported 30,288,527 pounds of copper, besides over 26,000 tons of copper ore. Add to this that the many enterprising mining speculators who try to plant their copper mines in Europe speak of producing copper at the cost of about four cents or five cents a pound, and it is after all explainable why this temporary great fall in the price of copper has taken place. In the meantime the fall in copper has shut up all the poorer mines in the world, which cannot produce copper for less than thirteen cents or fourteen cents a pound. And even such mines as the Burra-Burra, in Australia, and the great African copper mine near Namaqualand have not only curtailed their production, but some even say that they are partially shut up. The Calumet and Hecla is, of course, producing copper largely. The surface production of copper in the territories must sooner or later come to an end and the legitimate production will take its place. As may be well expected the consumption of copper during the last few years has increased enormously all over the world, and in many instances has replaced the usual use of zinc or spelter and also lead. Whether copper will again go up to the price of £100 per ton in a short time is, of course, problematical. But that it cannot remain at the present low price is perfectly certain. Indeed, it would not be a healthy state of things if it should. A steady price of £60 per ton for copper in Europe, which is equal to about thirteen cents a pound in New York, would give the production of copper mining a wholesome impetus, and would indeed be a lower price than ever it was sold at before for perhaps a hundred years until within the last eighteen months. Another anomaly is, although copper is about the lowest in price ever known in New York, yet, from all accounts, the actual stock of copper in America is exceedingly small. It would be well if any of the great copper dealers would explain this strange anomaly.

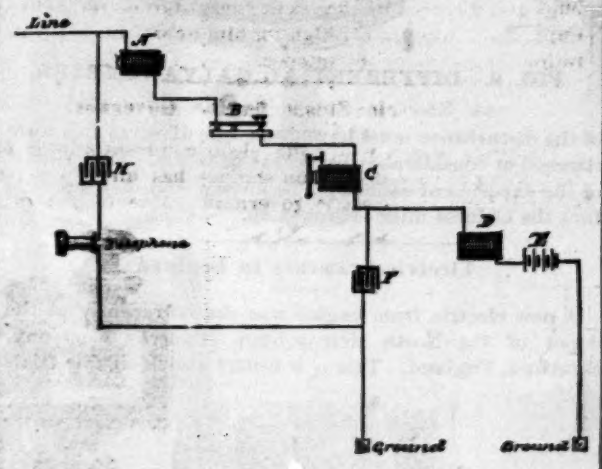
Simultaneous Telegraphy and Telephony.

BY GEO. BLACK, HAMILTON, ONT.

In THE ELECTRICAL WORLD of Nov. 28 is published a communication from Mr. Mackintosh, New Westminster, B. C., reporting "a successful test of simultaneous telegraphy and telephony over the same wire." The item concludes, "Would you be good enough to inform me if the test has ever before been successful over closed circuit system in America?"

If your readers will kindly refer to your issue of Oct. 21, 1882, and Feb. 3, 1883 (*The Operator* and *Electrical World*), they will see that I was the first to apply this in America, or anywhere else as far as heard from. In the latter article is described the working of the system between Toronto and Hamilton, a distance of 40 miles. My first operations date back to early in 1878, when I used the system daily in the city of Hamilton, working a telephone on a local wire between my office and house, where I already had a set of telegraph instruments in circuit. Dr. Roseburgh, of Toronto (my partner in this invention), and I have made many improvements since, and worked it most satisfactorily last winter between Toronto and Hamilton, in a mass of other wires, with electric light wires on the same poles at both ends, in full operation. All who tested it expressed surprise at the volume of voice and clear enunciation secured in spite of so many disturbing influences. We exhibited the system in operation at Washington in March, 1883. In April following I fitted up a wire on the Staten Island Railway, near New York City, which worked most satisfactorily. Your correspondent does not say whether he suppressed induction from operator's working his own wire while the same was in use for telephone purposes.

To simply make a telephone circuit, without suppressing



SIMULTANEOUS TELEGRAPHY AND TELEPHONY.

induction, the condenser *H* and telephone, as in diagram, will suffice. The effect would be greatly improved if Mr. Mackintosh had connected condenser *F* at a point between *A* and *B*, instead of between *C* and *D*; the magnet *D* is unnecessary in our apparatus. We use two condensers and *one* extra electro-magnet of equal resistance, etc., to the relay used. The condenser *H* is of very slight capacity—a few sheets of tinfoil is sufficient. Condenser *F* is of considerably greater capacity, depending upon the wire, magnets in circuit, battery, etc.

We have various methods of joining up according to the requirements of the case, but the above will give a general idea of the arrangement.

I claim that we hold the original and earliest patents on this device and had it in operation long before Van Rysselberghe invented his system.

In our case we use the regular telephones in use—Bell and Blake or Bell and Edison. We do not require specially devised telephones, as Van Rysselberghe appears to employ. Last winter we also tried the molecular transmitter with most satisfactory results.

My first experiments were with the Bell receiver before the days of transmitters.

We can also divide a long through telegraph wire up into shorter telephone circuits without interfering with the Morse. This system would be most useful to railway companies keeping up telephone communication with small stations while using their wires for ordinary telegraphic purposes.

I need not take up valuable space further than to say that we are negotiating with a gentleman in South America to introduce our system in one or more States, and are prepared to deal liberally with our Pacific coast friends.

Electric Steering Gear.

Last week we had occasion to witness the first trial of the electric steering gear invented by Mr. Charles H. Washburn, already mentioned by us. The U. S. Steamer Tallapoosa has been fitted up so that the compass needle, by closing an electric circuit, causes the rudder to be shifted automatically whenever the ship deviates from her set course. The experiment was made with the ship at the dock, and was only for the purpose of testing the working of the apparatus. The rudder was found to work when the needle was deflected in one direction, but failed to answer in the other. Subsequent investigation showed that some evil-minded person had disarranged the circuits so that correct action was impossible. This will soon be remedied and another test will be made in a few days. The system employed was described in our issue of June 13.

The Telegraph Service of Mexico.

We published recently the announcement of the selection by the Mexican government of Mr. Saturnino Islas as director-general of telegraphs, and expressed our belief that the appointment was a good one. A correspondent of the Boston *Herald* now furnishes the subjoined interesting particulars from the City of Mexico:

A genuine beginning in the direction of civil service reform has been made by the Mexican government. The department selected for the experiment is that of the telegraph section of the ministry of public works; and, to tell the truth, that department of the public service needed a clearing out. Only a very few months ago the Mexican government was operating 12,000 kilometres of telegraph lines, stretching from the northern States down into the fiery plains of Yucatan. The telegraph Service was a dead loss to the treasury of nearly a million dollars a year, for the nominal crediting of the treasury for government service amounted to nothing more than to make the books look well. The following is the way the government telegraph stood before the reform was begun:

INCOME.	
From private messages	$223,172,93
From government messages	616,965.84
Total	$840,138.77
EXPENSES.	
Salaries	$813,341.90
Preservation of lines	420,000.00
Erection of new lines	150,000.00
Total	$1,183,341.90

This exhibit, in the discouraging condition of the government finances, did not appear at all agreeable to President Diaz or to Minister Pacheco, of the Ministry of Public Works. The government then began looking around for the right man to take charge of the federal telegraph system and make it earn its expenses. There was talk of a private company being organized to take the lines on a long lease, agreeing to maintain them in good repair and make what profit was to be had, but that scheme fell through. After much search the right man was discovered in the person of Mr. Saturnino Islas, Superintendent of Telegraphs on the Mexican Railway to Vera Cruz. Mr. Islas, who is a first-class electrician and practical telegrapher, refused to have anything to do with the business unless he could take hold of the reorganization of the lines unhampered by the politicians, who here, as in the United States, fasten upon everything that money can be squeezed out of by contracts or through salaries for sinecure positions. President Diaz told Mr. Islas that he would back him up in his reform work, and the President is as good a man as Cleveland when he gives his word.

Having this assurance from the President of the Republic, Mr. Islas accepted the post of director-general of the federal telegraphs. Mr. Islas is a young man of about 35 years, of medium height, black-eyed, energetic in manner and, at the same time, exceedingly courteous, as are almost always Mexican officials. President Diaz likes young men of grit and energy, and, if the politicians are not too much for him, he will soon, through Mr. Islas, have completed the most thorough piece of reform work the Mexican government has ever undertaken. I have taken up this topic because it illustrates one of the most difficult matters the Mexican government has to deal with, that of effecting economies which put politicians out of office—a matter much more serious here than in the United States.

Already much has been accomplished. When Director-General Islas took hold of his office, he recommended that the federal government cede to the several States the purely local telegraph lines within their respective borders. These minor lines were, as a rule, in bad condition; the telegraph offices each contained a group of politicians contentedly drawing salaries for doing nothing at all, and were, in fact, a nuisance. This was done, the States agreeing on their part to accept the lines as a free gift conditioned on their being kept in good working order. Thus, by a master stroke of policy, Mr. Islas got rid of a lot of little lines which could not be made to pay a revenue. There now remains to the government several great trunk lines tapping every State capital, every large city and important town. A few gaps remain to be filled. As yet Sonora is not in connection with the west coast government trunk line, but will soon be provided with a line. It is also necessary to build a trunk line connection down into Yucatan. The Central Railroad Company is to be required to maintain, on its own poles, two wires stretching from this city to Paso del Norte, the government providing the wire and insulators. Work on this extension was commenced some weeks ago, but, owing to a lack of proper insulators, has had to be postponed for a while.

The chief office of the government telegraphs is on the Callejon del Espiritu Santo; it is a two story stone building, with the usual patio, or courtyard, formerly occupied by the Mexican Telegraph Company. Three months ago Mr. Islas took up his official abode here. There were then in the building 52 officials, most of them supposed to be operators, but in reality politicians quartered on the government, as is to be seen in Chicago and New York public offices to this day. These telegraphic politicians of elegant leisure were chiefly occupied with cigarette rolling and puffing, and actually there were not chairs enough to give them sitting room, but this was no deprivation to them. They much better enjoyed loafing around the corridors. The office was then a dead loss of over $7,000 a year to the government. The batteries were as antique as possible, the instruments were wretched things, and the wires a sight to behold.

Yesterday, when I called on Mr. Islas to get additional details of his reform work, I found no groups of politicians, no smoking, no lounging about. The force had been cut down two-thirds, and the loafers were out in the street lamenting the progress of reform. Every operator was in his seat, and all had something to do. The instruments were modern and kept clean, the battery room, a new feature, was supplied with American apparatus, and as clean as a man-of-war's deck. The energetic spirit of the young Mexican telegraphic reformer was everywhere in evidence. In the operating room I noted a duplex instrument for the service between this capital and the important city of San Luis Potosi, and Mr. Islas said that he was going very soon to have a duplex service to both Vera Cruz and Acapulco, the latter city away over on the Pacific coast. The office here, Mr. Islas said, was now self-sustaining, and he proposed to make the entire service pay a profit when his reforms were effected. It would require time, he remarked, to get all the local offices in good shape and to repair lines now in bad order, but he was pursuing the policy of doing one thing at a time and doing it thoroughly. The politicians objected to his wholesale discharges of useless men, but he was putting them out and was sustained at every step by the President. He intended to change radically the different district systems by putting at the head of each telegraphic district a man competent for his duties.

Mr. Islas speaks English fairly well and reads it perfectly, and has traveled extensively in the United States, visiting the great telegraphic centres and studying the systems of work and office organization. He is full of modern ideas, and illustrates what I have often written you regarding the younger generation of Mexicans, who are thoroughly trained in technical matters and anxious to push the country ahead. In conjunction with Superintendent Van Valkenburgh of the Mexican Telegraph Company, Mr Islas edited the *Electricista*, an excellent weekly of short life, but excellent character.

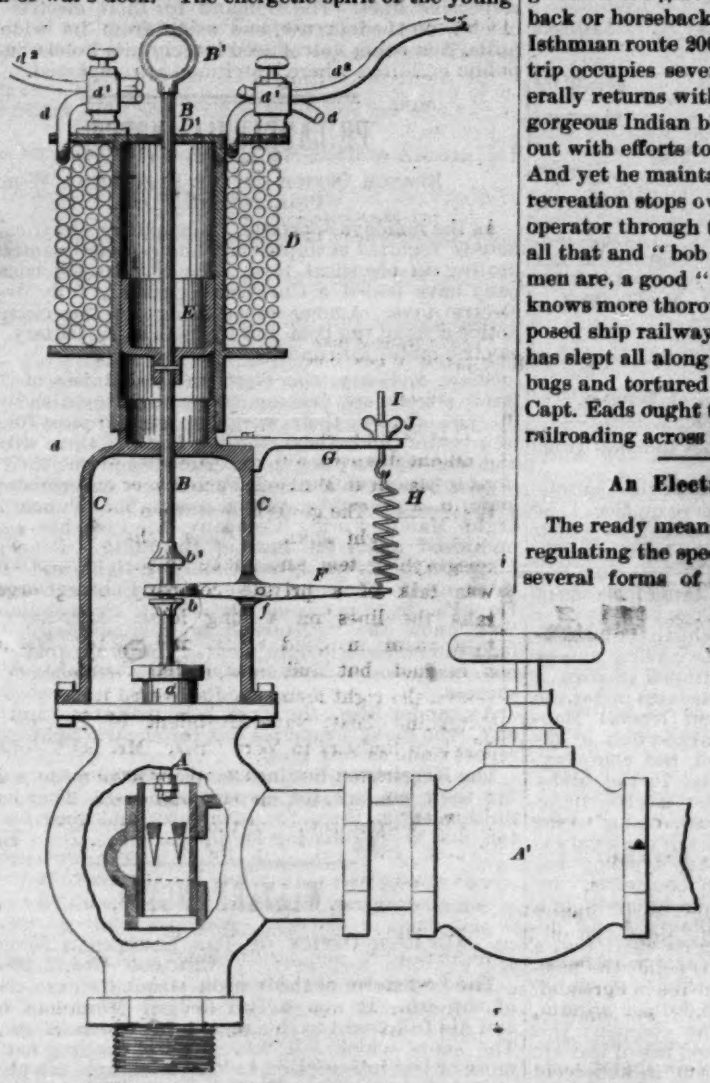
The government telegraph service, as will have been seen sorely needed the broom of reform. In some petty local offices, where in the United States a youth of 20 would have been the sole official, there were five men, a chief, an operator, a lineman and two nobody knows what. The chief smoked, the lineman smoked, the operator smoked and the two nobody knows rolled cigarettes, and read novels. But they were all on hand for their salaries. The treasury books show the cost of all this smoking and lounging at government expense.

An American telegrapher would find much amusement in studying the old-time Mexican telegraph system which is now being so rapidly reformed. He would, for example, be puzzled to account for the non-arrival of a telegram from Mazatlan at the capital till the twelfth day after it was sent. But investigation would show him that somewhere along the line up from the Pacific coast the wires were down, and that when the telegram had got as far as it could it was taken off by some local operator and sent on by diligence. Notwithstanding the extraordinary number of linemen at the petty local offices, the lines were generally "down." The linemen were too busy drawing their pay and smoking cigarettes to look after the wires, and mañana was just as good as "right now" to them.

Managing telegraph lines in this sparsely populated country is not an easy task. Supt. Van Valkenburgh has occasionally to make a trip from this city over to the port of Salina Cruz on the Pacific side of the Isthmus of Tehuantepec. He has first to take rail to Vera Cruz, then to go down the gulf coast by steamer and thence by mule-back or horseback, as luck will have it, across the hot Isthmian route 200 miles, eating tortillas and chile. The trip occupies several weeks, and the genial electrician generally returns with a complexion sadly damaged, a lot of gorgeous Indian blankets, or serapes, and a stomach worn out with efforts to assimilate red pepper in big chunks. And yet he maintains his invariable good humor, and for recreation stops over in Vera Cruz to nurse some new operator through the yellow fever. A man who can do all that and "bob up serenely" every time is what few men are, a good "all 'round man." No man in Mexico knows more thoroughly every inch of the route of the proposed ship railway than does Mr. Van Valkenburgh. He has slept all along the line, been bitten by innumerable bugs and tortured by jiggers at every station on the way. Capt. Eads ought to bid high for him to explain mule-back railroading across Tehuantepec.

An Electric Steam Engine Governor.

The ready means which the electric current affords for regulating the speed of steam engines has already led to several forms of electric governors. One of the most recent of these is that of Mr. A. L. Ide, the well-known engine builder, and of which we give a description below.



AN ELECTRIC STEAM ENGINE GOVERNOR.

As the illustration shows, the governor is designed so that the ports of the valve shall work in connection with the upper cylindrical valve-seat, the ports being closed more or less as the valve is thrown upward by the action of the electric current through the magnet; but it is also contemplated that after the engine is shut down, by closing the stop-valve A' in the usual way, the valve shall be forced downward so that its ports are closed within the lower seat. In case the electric current is broken, or in case the driving belt of the engine is broken, the valve will be closed by being thrown downward, so that its ports are carried within the lower seat.

In the construction of the electrical arrangement the helix D is applied to a hollow spool with its axis coincident with that of the valve-stem B, being mounted fixedly upon the arch C. The insulated wires d d terminate in binding posts d', fixed to the spool, and receive the wires d^2 d^2, leading to and from the dynamo, and thereby bringing the helix D into the electric circuit of the dynamo. The valve-stem B is provided with the armature E, affixed thereto in proper position with reference to the helix to be raised by the latter when the force of the electric current is augmented therein. The stem is also provided with the fixed collars or shoulders b b', between which projects the branched end of the lever F, pivoted in the arch C at f. The outer end of the lever is connected with the fixed arm G by the contractile spring H, made adjustable as to its tension by the screw-threaded hook I and thumb-nut J.

By depressing the outer end of the lever F the stem B may be raised to bring the valve A into working position, as shown—that is to say, with the ports in the steam space between the seats. Whenever the speed of the engine becomes too great, the corresponding excessive force of the electric current, operating through the magnet D, will raise the valve and bring its ports partly within the upper seat, and thereby proportionately cut off the steam supply and lower the speed of the engine. The stem is also shown prolonged through the upper end plate D', of the spool (which serves as a guide), and provided at its free extremity with a ring B', by which also the valve may be raised to its working position.

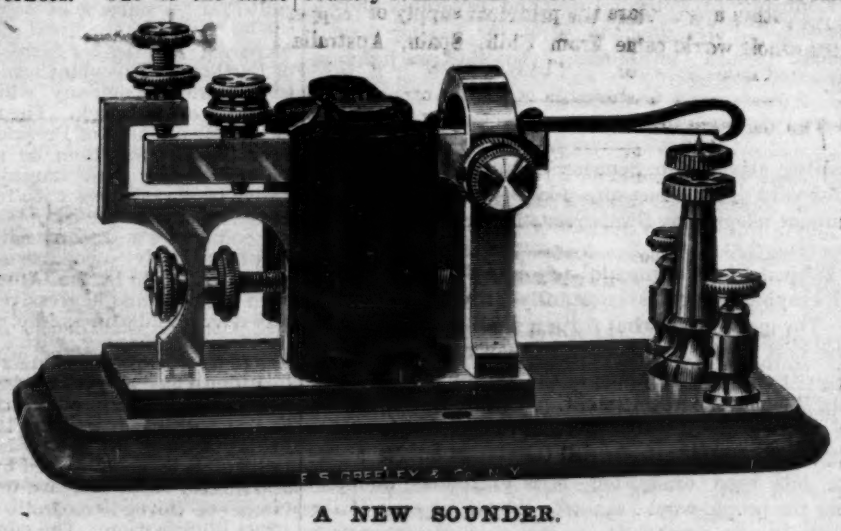
In the use of the particular form of valve shown, or of other forms having similar action, should the current be broken, the valve falls by its own weight, and, reinforced by the spring H, shuts off the steam supply by carrying the ports of the cylindrical valve into the lower seat. It is clear that the governor described may be applied to control an engine through the medium of a variable cut-off by connecting the armature with the rod or other part operating the cut-off mechanism. The method here employed is a very convenient one, and may, with suitable alterations, be applied with equal facility to other forms of engine, such as the turbine.

A New Sounder with Bi-Resistance Coils.

The accompanying illustration represents the "Economic," a new and ingenious sounder just introduced by Messrs. E. S. Greeley & Co., successors to L. G. Tillotson & Co., of this city.

The sounder is designed principally to save the battery, which, with the usual form of sounder, is clo ed on low resistance. To effect this, the "economic" sounder contains two sets of resistance, and is so constructed that there is only the usual amount of resistance in its coils (about 3 ohms) when the circuit is open, so that it responds to the closing of the circuit with all the activity of the ordinary sounder. But as soon as the armature lever strikes the anvil, it throws 100 ohms resistance into the circuit, thus preventing the rapid absorption of the battery power incident to short circuit. As soon as the circuit is opened again, and the armature released, the sounder returns again automatically to the local basis with all the rapidity and smoothness of an unchanged resistance.

Computation from actual tests over an extended period of time shows that the average saving of battery power in large offices where the sounder is kept in most active use is very large, and in railroad offices, and especially in country commercial offices where the sounder is idle for a large part of the day, the saving is still greater. It robs nothing from the power of the instrument when the magnets are exerting their force to attract the sounder, but when that work is accomplished, it immediately throws into circuit its 100 ohms resistance as a guard against extravagant waste, and no matter how rapidly the work is carried on, it cannot be too quick for this ever-present and infallible guard that confines the outlay of strength to the limit of necessity, which has been demonstrated to be, in even the most active work, less than 25 per cent. of the whole power usually expended.



A NEW SOUNDER.

So far from its use exciting any prejudice in Morse practice, it has been remarked by operators after having had the instrument in use for some time, that the "economic" sounder gives forth a peculiarly soft, agreeable tone, with an entire absence of the racking thud of the ordinary sounder that shocks the oral tympanum, and renders a recurrence to its voice seem notably harsh and hard to a sensitive ear. There is a marked difference in tone between that of the up stroke and the down stroke, facilitating in a surprising manner the work of the ear in translating the sound, so that the rapidity of the same writing, by clearer partition of the signals, is made to seem much reduced.

Owing to the fact that under the principles of construction upon which the economic sounder is based, the cores of the magnets begin to demagnetize as soon as the armature strikes the anvil, and continue in the operation of demagnetization up to a certain limit, the tendency to stick is reduced, it is safe to say, over 75 per cent.; and for the same reason the armature is more ready to answer to the tension spring upon the opening of the circuit, thus creating additional conditions favorable to clearer annunciation in rapid sending.

The Telephone Tit Willow.

He slapped at his chest, and uttered a vow,
Sounding "Hello, oh! Hello, oh! Hello!"
And a cold perspiration bespangled his brow—
"Oh, Hello, oh! Hello, oh! Hello!"
He sobbed and he sighed and he grew very pale,
And an echo arose like an agonized wail,
As piercing as the tap on a tin dinner pail,
"Oh, Hello, oh! Hello, oh! Hello!"

It was almost as certain as life that his name
Wasn't "Hello, oh! Hello, oh! Hello!"
'Twas a powerful passion that made him exclaim,
"Oh, Hello, oh! Hello, oh! Hello!
Then his voice dropped into a perilous sigh,
He perished right there—and would you know why?
Because tightly lodged in his throat was the cry:
"Oh, Hello, oh! Hello, oh! Hello!"

—*Indianapolis Times.*

The Electric Light in Passaic, N. J.

BY DR. CONRAD STERN.

Passaic has also got its electrical illumination now. There was a great deal of wondering by the good people of Passaic when a few weeks ago poles were erected and wires strung on them—stout wires, too—and there was a still greater surprise the other evening when lamps were hung up on these wires, and the lamps were lit up all at once.

There are 15 arc lights burning at present; 11 on the streets, and four in stores of some of our more enterprising tradesmen. The current is supplied by a Hochhausen dynamo machine, which is placed at the Passaic bleachery of Messrs. Watson, the power being furnished by a small double engine of 15 horse-power. The armature runs at a speed of 900 revolutions per minute, and the lamps, Bossier's patent, in series, burn very brightly and steadily. I am also told that incandescent lights are to be put up in Messrs. Watson's factory very soon, and it may fairly be expected thereafter that private houses also will be supplied with the same lights.

The present installation is only an experimental one; but the public at large is so much pleased with the new light, and the poor gas lights near the electric lamps are such a pitiable sight, that it is hoped the demand for enlarging the present plant will be great enough very soon to enable the enterprising company to put up another and more powerful dynamo machine in addition. Mr. J. T. Noonan, manager of the New York and New Jersey Telephone Company, in Paterson, well and favorably known in professional circles, deserves credit for having done a good deal toward introducing the electric light in Passaic.

The Governmental Telegraph Agitation.

In calling attention to Senator Edmunds' intention to bring forward again a measure for the establishment of government telegraphs, *Bradstreet's* has the following judicious remarks:

The subject of governmental action in connection with the telegraphic service is constantly growing in importance. The question of what form it shall take so as to secure the best results is, however, one not easy of solution. The remedy usually suggested is the taking over of the existing lines by the government. Besides the objection to this on the score of a vast increase in the civil service—a thing hardly to be desired until the poison of the spoils system has been eradicated—it is extremely doubtful whether the people would sanction the taking over of the telegraph lines at a cost to the nation approximating their present capitalization. The only acceptable measure in such action would be the value of the existing plant estimated on the basis of the cost at which it could be duplicated. The large amounts of fictitious and watered capitalization represented in the stock of Western Union would certainly prevent any other treatment. It is also to be remembered that the present competitive rates between the principal points east of the Mississippi River are relatively lower than in any other country in the world, and that it is doubtful whether government telegraphy between such centres could be conducted at the present competitive rates without loss to the government.

The main object sought by the Edmunds bill being the maintenance of competitive rates, it seems that the same object could be attained by simpler means than by the government itself entering the field. An act of Congress of 1866 granted certain privileges to telegraph lines in connection with rights of way along post routes and over the public domain. In return, however, for the privileges granted, the companies in accepting the provisions of the act consented to the acquisition of any or all of the lines by the government, at a valuation to be decided by arbitration. In the decision known as the Pensacola Telegraph case this act was affirmed by the Supreme Court, and the power of Congress to regulate the telegraph lines pretty well indicated. Perhaps it would not be practicable or desirable for Congress to attempt to prohibit by legislation any further consolidations, amalgations or poolings. But it would certainly appear within the province of Congress to fix the present competitive rates as the maximum of charges. The companies would not complain of such action. Western Union especially boasts of its ability to continue the payment of dividends under the present scale of rates. Further, it would certainly be within the power of Congress to compel the land-grant and subsidized roads to perform the obligations imposed by their charters on themselves, furnishing a telegraph service for commercial messages. At present these roads, without exception, have transferred their telegraph lines to the Western Union in defiance of the plain provisions of their charters. Legislative action could, no doubt, be effectively used in forcing them to conform to their obligations in respect to telegraphy with great benefit to the entire section west of the Mississippi. It is well worthy of inquiry whether the direct exercise of the power of Congress upon the existing companies may not be found to be, for the present, at least, most effectual means of governmental interference with telegraphy in the interest and for the benefit of the public at large.

Western Telephone Figures.

The fol'owing is the statement issued Nov. 17 to stockholders of the Nebraska Telephone Company:

	For quarter end'g July 31.	For quarter end'g Oct. 31.
Gross earnings	$27,169.59	$28,221.81
Gross expense	17,050.25	17,065.62
Net earnings	10,119.34	11,156.19
Increase earnings over previous quarter	1,639.88	1,052.22
Increase expenses over previous quarter	795.61	15.37
Increase net earnings over previous quarter	844.27	1,036.85
Per cent. expense to earnings	62 5-6	60 4-10
Net-gain paying stations	77	53
Dividends paid, cash	$5,819.33	$5,836.00
Dividends paid, certificates (from surplus)	.....	13,937.30

During the six months we have built the following lines:

Avoca, Ia., to county line east	12 miles
Wilber, Neb., to DeWitt	8 "
Frement, Neb., to Columbus	49 "
Total	69 "

Besides providing for all ordinary exchange construction, this has been done out of earnings and the sale of 85 shares of treasury stock at par.

L. H. KORTY, Sec'y.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, Dec. 7, 1885.

The following interesting matter comes to hand from Portland, Me:

"A meeting of the full board of directors of the Consolidated Electric Light Company was held here on Dec 1. at the offices of the company, on Exchange street, at which President Goff of the American Electric Manufac uring Company of New York was present. The meeting was called for the purpose of considering the rapid increase of the business and the great demand upon the company for increased acilities for furnishing more light to the citizens of Portland. This plant was established two years ago by the American Company, which has continued to own a majority of the stock. The increase of business under the local management of President Rollins and General Manager Sawyer has been so rapid and marked that it has astonished the most sanguine friends of the company, which began business with forty arc lights, in the midst of the most determined opposition of other electric lighting companies and many natural prejudices, owing to the fact that the city owned two-fifths interest in the local gas company. While the American Company's policy has been vigorous and aggressive, it has been courteous, conservative and business-like, treating other interests in a business-like manner, with a seeming willingness and desire to have the new business treated upon its merits as a legitimate business enterprise. Under this policy the business has grown to be one of the most extensive in Portland, and a contract for lighting the city at $25,000 per annum, to the exclusion of gas, was awarded the company this fall. This is accomplished by the combined use of the arc and incandescent systems, using the Edison incandescent lamps of thirty-two candle power for a portion of the street illumination. The company has now a capacity of 300 arc lights of 2,000-candle power each, and 500 incandescent lamps of thirty-two candle-power each, with an annual income of about $45,000 for city and commercial business. The demand for more light is still as strong as it was one year ago—for more arc lights and an Edison incandescent plant for general interior illumination throughout the city.

"A general plan was submitted and adopted to-day by which the company is to purchase 5,000 square feet of land in addition to the 15,000 now owned by it, on which to build a new station with boiler and engine capacity of 500 arc lights and 5,000 Edison incandescent lights of from twelve to fifteen candle-power each, for residence and general interior illumination. The American Company will supply all the material and construct the new works, which will be, when completed, one of the most perfect electric lighting stations in the world. The business has now been conducted long enough to fully demonstrate its financial success, and the success of the American Company's system of conducting business here and elsewhere will no doubt have a marked effect on the future operations of the company in placing the legitimate electric lighting interests of the country upon as firm and profitable a basis as has ever been occupied by the gas companies."

A terrific explosion took place in the chemical laboratory at Tufts College, Dec. 2, several large sealed tubes full of a poisonous alkaloid bursting while at a temperature of 300° centigrade. The furnace, also, was blown to atoms, one piece just missing a man's head. The poisonous vapors escaping from the tubes prevented the occupation of the building for the rest of the day.

The British cable steamship Minia, of London, England, arrived at Gloucester, Mass., on November 30. The steamer has lately been repairing the cable off Halifax. She is a large three-masted, twin-screw steamship of 2,000 tons burden.

At Beverly, Mass., Nov. 30, a town meeting was held, and it was voted to adopt an electric system of fire alarm. It has not been determined what system is to be used, but in all probability that of Messrs. Martin & Wilson, of this city, will be selected by the committee appointed for that purpose.

At New London, Conn., the electric light company has succeeded in bridging over the difficulties thrown in its way by the recent refusal of some of the property owners in Main street to permit the erection of poles in front of their premises. The company has run zig-zag lines and made extra long spans. Promise has been made that the city will be illuminated by electricity before the end of the present week.

Mr. R. H. Brown has had a plant of 75 incandescent lights of the Brush-Swan system installed on his premises, which, if satisfactory, will involve an increase to double that number of lamps after the holidays.

The E. Howard Watch and Clock Company, the first of its kind in the United States, is comfortably settled in its new store, corner of Washington and Franklin streets, and a visit to the well-arranged show-room is a treat to persons of artistic tastes. Among other handsome things is a companion clock to the finest one ever made in this country, and it is a rare specimen of horological art. This concern now makes a specialty of old-fashioned hall clocks, or, as they are popularly known, "Grandfather clocks," and show seven different designs, costing, according to the finish and works used, from $175 to $1,200. These clocks are made in the most thorough and substantial manner, well worthy of being handed down as heirlooms to future generations. The company will open a branch house in Chicago, Jan. 1, for the accommodation of its large and growing Western business. Mr. Harry E. Howard, now of the New York house, will have charge of the clock department, while Mr. E. V. Clergue, of Boston, will occupy a similar position in the watch department. Both these gentlemen are of long experience in their respective lines. The demand for their electric watch-clock is on the increase, and aside from its wide use in mills, it is being introduced largely into hotels and other public buildings where watchmen are employed.

PHILADELPHIA NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
PHILADELPHIA, DEC. 5, 1885.

As the holidays approach, trade among electrical people here is reported as improving, and especially among those dealing in electrical toys. The Novelty Electrical Company have issued a Christmas circular, fully describing electric toys. Among other things in the circular, we notice a small tug boat run by an electric battery and an electric motor for running toys.

Shaw & Geary, the electrical machinists of 7th and Arch streets, are making quite an innovation by fitting up, just off from their workshop, small rooms for the use of inventors and others who may come to them with work, and who want a place to experiment and put their inventions to practical tests. They are very enterprising, energetic, and deserving young men. The Yunck Electric Light Manufacturing Company, Limited, has just been organized under the laws of the State of Pennsylvania. They use the Cohen dynamo and arc light, and claim for them great efficiency. The Nagle Engine Company, of Erie, Pa., have just come out with a new engine which they name the "Electric," as it is specially designed for running electric light plants; and I am told that at a test made some days since, it gave evidence of perfect success.

Alexander Bros., the large belt manufacturers of this city, who make a superior belt for electric light purposes, report trade as very good.

The Kensington Engine Company have quite a demand for their engines for electric lighting. They have just finished seven, three for Johnstown and four for Scranton, and are negotiating for several more.

E. F. I.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
CHICAGO Dec. 7, 1885.

The first storm of the season struck Chicago the night of the 4th. It was a full fledged Minnesota blizzard, and did full credit to the region in which it originated. The snow which fell was of a wet clinging nature, and more or less interruption to the telegraph, telephone and electric light service was the result. The telegraph line between here and Michigan City went down, and there was trouble on the Ft. Wayne line. Other lines suffered in a less degree, but by Saturday night nearly all the lines were working all right again.

At Lafayette, Ind., the Western Union Telegraph Company is endeavoring, by injunction, to keep the electric light company off the former's poles. The Western Union Company is at present without opposition in Lafayette, Ind. The article will soon be furnished, however, by the Baltimore & Ohio.

Brazil, Ind., has just started its electric light plant.

The Electrical Supply Company is making some strong claims for its improved diamond carbon battery. It is now asserted to be the first open circuit battery made. Simplicity, neatness, high electromotive force and small internal resistance are some of the claims made for this battery in its improved form. For electric bells, annunciators, burglar alarms, gas lighting and telephones, it is said to be without an equal, lasting, with trifling cost each year, for ten years. Why does not the Boston capitalist who is advertising in the WORLD for some one with an electric lighting system which they want pushed come West? The writer hereof can give him at least two pointers, either one of which might be satisfactory to him. We can also show him as neat and tidy and complete a little factory as he ever set eyes on which is just in need of exactly such a man as himself. Come West, young man; come West! Or, at least, write West!

The Thomson-Houston plant, at Bloomington, was started Tuesday night, Dec. 1, 100 lights strong. Forty-five more lights are to be immediately added.

A 25 light arc plant, for Galesburg, Ill., is a Thomson-Houston order.

The Utility Manufacturing Company, of 55 Fifth avenue, Chicago, are general suppliers of electric apparatus.

Leander D. Parker, receiver of the Bankers and Merchants' Telegraph Company, has filed a petition asking that the property of the company be sold. The other property outside of Illinois, it was alleged, had been sold under a decree of the Supreme Court of New York last August to Edward S. Stokes, and possession given to the purchaser. The Court ordered a reference to Master in Chancery E. B. Sherman, before whom the creditors will present their claims.

Mr. A. C. Knapp has severed his connection with the Inter-State Telephone Company, and is now on a trip East.

The tests recently made of the Elevated Railroad and Brooklyn Bridge structures, showing that both are heavily magnetized, go far to prove the theory of Giles Brothers, the Chicago jewelers, that magnetism in sufficient quantities to affect the delicate mechanism of a watch is generally prevalent. The readers of the WORLD are familiar with the Giles anti-magnetic shield and the claims made for it. It is one of the innumerable inventions made necessary in this electrical age. That it is an entire success has been conclusively proven, and that it is a necessary adjunct to a reliable watch, the statement concerning the elevated railroad and the Brooklyn Bridge prove witness. An anti-magnetic shield circular can be obtained free by addressing Giles, Bro. & Co., Chicago.

Among the late orders of the Western Electric Company are the following for electric lighting apparatus:

A 25-light arc machine for Bucyrus, Ohio. This is the second outfit of this size sent to Bucyrus.

A 50-light arc plant for Sandusky, Ohio.

A 40 light arc plant for Green Bay, Wisconsin.

Thirty of the 50 arc lights put in by this company at Champaign, Ill., were started this week. This plant covers Urbana, Ill., as well, the two places being quite near together.

Work is in progress on the company's Milwaukee avenue 50-light arc plant in Chicago.

The Western Electric Company's apparatus gives satisfaction wherever it is placed.

Late Van Depoele orders are:

Two 30-light arc machines for Des Moines, Iowa.

A 40-light arc machine for Kearney, Neb.

An increase of 20 arc lights in the J. V. Farwell Chicago plant.

Among the late sales of the Western Department of the United States Electric Lighting Company are the following:

Three hundred light incandescent plant at Kansas City, Mo.

One thousand light incandescent plant for the Equitable Life Insurance Company's Building, St. Louis.

One hundred and twenty-five light incandescent plant for Centralia, Wisconsin

Fifty light incandescent plant for a mine in the Rocky Mountains.

The National Electric Service Company reports the following orders for Johnston's electric valve apparatus:

C. B. Farwell, residence Chicago: John B. Kirk, residence Chicago; W. J. Chalmers, residence Chicago; Second Presbyterian Church, Chicago; John Cudahy, residence Chicago; W. F. Poole, residence Chicago; O. D. Wetherall, office Chicago; John Davis & Co., office Chicago: Union League Club, Chicago; Justice Hammer's residence, Chicago; J. W. Elsworth, residence Chicago: Prof. Elisha Gray, residence Chicago; Architect Holtz, residence Chicago.

Among late Eastern orders are the following:

J. B. Cottrell, residence Westerly, R. I.; M. B. Cory, residence New York; A. H. Andrews & Co., stores New York and Boston: Madison Square Church, New York; R. T. Rockwell, residence Orange, N. J.

It will be seen that the company's system of electric steam regulation is receiving the solid indorsement which orders and plenty of them give.

The Wisconsin Supreme Court has decided that the printed contract on the message blanks of the Western Union Telegraph Company is void.

"Do you know," said an operator at the Western Union Building, Chicago, to a newspaper reporter the other day, "that few people outside the doctors and the telegraph receivers realize how many babies are born in the world? Why, there isn't a day, Sundays included, that I don't handle from fifteen to twenty-five 'baby telegrams,' as we call 'em. By these I mean telegraphic announcements of the advent of little strangers. There's a good deal of human nature in these messages. Of course they are usually sent to the little one's grandparents, and they take on all shades of exuberance from the wildly exalted ecstasy of a first-born to the cold, formal and not infrequently disgusted announcement of the sixth. I will say, however, that after the second or third event of the kind the lightning is not drawn on so recklessly. The slower process of the mails is considered enough for the emergency. The coming of the first, however, is as sure to bring out an excited telegram as that the sun shines. It is great fun to watch the senders of these first baby dispatches as they prepare them. A young father comes in with hurried step and exultant beaming face. He grabs a blank and dashes off something like this: 'Great news! Mary very ill. Fine boy!' Then he tears that up. Somehow he doesn't want the rude telegrapher to know the name of the gentle but happy sufferer, and he tries it again. 'Expected event realized—a little girl; wife doing well.' 'But pshaw,' he says, 'that's rather a cold way to speak of her to her own father and mother. "Wife," why of course she's wife, but I don't like that,' and he tears it up. Then he starts again and this time he says: 'Confound the telegrapher, he shan't know anything about it,' and he writes: 'It has come—eight pounds—female. Mother all right.' He looks at it a minute, and tears it up, with the remark: 'They won't know whether that means a Jersey calf or a Hambletonian colt.' By this time the young man has got into a sweat, and grabbing a pencil he dashes off: 'It's a girl. Mother doing nicely,' and after looking at that five or six minutes, and may be with a moistened eye, he signs his first name to it and hands it in. They're all about alike, these first young fathers. They're proud and happy and conscious, and yet they will do almost anything to conceal their identity. Sometimes the young man comes in showing signs that the great domestic event has been too much for him, and then I have to take the pencil and help him out, and I do it in a practical way. I get the address and I simply write: 'The little stranger is here. It is a girl (or boy). Mother well,' and then the man pays over his half dollar and nearly pulls me through the window in his fierce desire to have me go and give the baby a bath. There is great fun in a telegraph office when the baby business has been particularly good, I can assure you."

Electric governors for steam engines are receiving the attention of the experts. Two Western inventions are in the field—the Ide governor, made by A. R. Ide & Son, the well-known engine builders, of Springfield, Ill., and the Amet governor, manufactured by the Globe Iron and Electric Engineering Works, Chicago.

Eugene E Howell, a judgment creditor of the Postal Telegraph and Cable Company to the amount of over $60,000, filed a cross bill in the suit pending against him in the United States Circuit Court, asking that the property of the company be sold, as it was insolvent, to satisfy the judgment.

THE TELEGRAPH.

T. M. B. A.—The assessment for December, No. 193, covers the death claims of E. F. Leighton, M. S. Palmer and W. W. Osborn.

Gould's Underground Wires.—Some developments regarding Elevated Railroad stock lead the brokers of New York to fear that Mr. Jay Gould still has an underground wire to Wall street.—*Providence Journal.*

Phelps Induction Railway Telegraph Co.—In our last issue, through a misunderstanding, we quoted Mr. Phelps as saying that the line on his system could now be run for $50 per mile. This is an error and should read $60.

A New Company.—The New York & Chicago Telegraph Company has been incorporated by T. R. Crawford, Singleton L. Crawford, and David O'Brien, of New York, and J. E. Van Pelt, of Chicago, to build a line of telegraph from this city to Chicago. Its capital stock is $1,000,000, divided into 10,000 shares of $100 each.

Washington, D. C.—The Mutual District Messenger Company, of Washington, D. C., is in a very prosperous condition, having practically the control of the burglar alarm, night watch and messenger service in the District of Columbia. At a recent meeting of the directors of the company the following mentioned gentlemen were elected directors: D. H. Bates, C. Selden, W. H. Ijams, E. C. M. Bruce, W. E. Huntington, W. H. Woolverton, Geo. F. Truell, Dr. W. T. Barnard and Wm. F. Chester.

Sustaining an Injunction.—On Saturday last the Supreme Court of Arkansas rendered a decision in favor of the Arkansas Telegraph Company, on the appeal of the St. Louis, Iron Mountain & Southern Railroad Company from the decision of the lower court, which gave the Arkansas Telegraph Company an injunction to restrain the Iron Mountain road from interfering with the new telegraph line to Hot Springs, Ark., in connection with the Baltimore & Ohio system This removes the last obstacle, and competitive telegraphy at Hot Springs is promised before Christmas.

Litigation over Western Lines.—Judge Blodgett and Judge Moran held a private conference at Chicago, Dec. 4, relative to turning the property of the Board of Trade Telegraph Company over to the corporation, it now being in the hands of L. D. Parker, Receiver of the Bankers and Merchants' Telegraph Company. The result of the conference was that Judge Blodgett decided not to turn the property over at present, as it was not deemed best for the company to incur any further litigation if possible. In the case of the Postal Telegraph and Cable Company against Eugene N. Howell, the defendant has filed a cross bill before Judge Blodgett, setting out that on June 1 last he recovered a judgment for $61.266 against the company, which he has been enjoined from collecting. The company is insolvent and in the hands of A. B. Chandler and Henry Rosener, and is not earning enough to pay the judgment, and he asks that the assets may be sold by order of the court to pay his claim.

United Lines.—A dispatch of Dec. 2 from Baltimore says: Last week the City Circuit Court allowed a claim of $10,000 in favor of William A. Dunn against the United Lines Telegraph Company, and the company was ordered to pay the amount of the claim into court not later than Dec. 2. Yesterday Francis P. Stevens and John V. L. Graham, Receivers of the United Lines Company in Maryland, took possession of the offices, and announced their intention of closing the offices and discharging all employés to-day; but this morning Mr. William N. Cohen, of New York, counsel for the company, appeared before Judge Fisher and obtained the privilege of keeping the offices open until the 17th inst., on which date the Receivers have advertised the sale of all the property belonging to the company in this State to satisfy claims against it. The privilege was granted in consideration of a deposit with the court of $1,000 to pay the running expenses of the concern up to the time of the sale. It is understood that the property will be bought in for the company and the business reorganized.

THE TELEPHONE.

"A There."—"Hello!" has been abolished, it is asserted, as a telephone starter, and the expression, "A there!"—a corruption of "Ah! there"—is now the proper thing, as it rhymes with the answer of the young lady at the exchange, who sings back, "Stay there!"

Continental.—The annual meeting of the Continental Telephone Company occurs at No. 95 Milk street this week. The dividends of 5 per cent. on International Bell stock and 2 per cent. on Tropical American stock give holders of Continental stock an increase of 3 per cent. per annum.

A Telephone Cable for Newburgh, N. Y.—The telephone cable to be placed in the Hudson River at Cornwall from Storm King Mountain to Breakneck was received in Newburgh on Saturday last, to be laid this week. It is 3,000 feet in length, weighs four tons, and is composed of five strands. The laying of this cable will give Newburgh and other places in the vicinity the telephone communication which has for some time been much desired.

The Drawbaugh Decree Undisturbed.—After rendering his decision in the suit of the American Bell Telephone Company against The People's Telephone Company for infringement of patent and for an injunction, Judge Wallace, of the United States Circuit Court, allowed the defendants, who were defeated in the action, to put in additional evidence on statements made that it was new and of an important character. Last week he decided that this new evidence did not affect the merits of the case, and therefore the decree formerly ordered should not be disturbed.

Next.—A new device has been invented for telephone stations. It is so constructed that a person wishing to use it enters a box, and on depositing a nickel in the fare box a clock indexes his entrance, and he is permitted to occupy the box five minutes. At the expiration of that time he must leave the box, or, if he remains, he must pay a second fare. Should he decline paying the fare he is bolted within, and the machine telephones the fact to the central office. Then he must remain until released by a messenger from said office. These boxes are designed for cigar shops, drug stores, and such places accessible to the public.

Waiting for Lamar's Decision.—A dispatch of Dec. 2 from Washington says: It is expected that the decision of the Secretary of the Interior in the telephone case will be rendered within a day or two. The briefs of the counsel for the telephone companies were all handed in last week. They were very voluminous. Nevertheless, the opinions of the Commissioner of Patents and of the two assistant secretaries have already been prepared and handed to the Secretary of the Interior. It is stated that they all agree in recommending that the validity of the Bell telephone patents be tested in the courts. This is expected to be the decision of the Secretary of the Interior.

Brazil.—News has been received at the office of the Tropical American Telephone Company of the consolidation at Rio de Janeiro of the Companhia Telephonica do Brazil with the Companhia Unido Telephonica do Brazil. This latter company now controls all telephonic interests in Brazil, having only a short time ago acquired the patents and contracts of the Companhia Nacional de Electricidade and Companhia de Telegraphas Urbanos. By this fusion of interests the Tropical company receives 70,000 milreis, say $30,000. in 8 per cent. debentures of the Unido company, and will supply all telephones and telephonic instruments and supplies under a permanent contract. One hundred complete sets have just been forwarded to the new company. Officers of the Tropical American say there is no doubt about the payment of dividend No. 3 next month.

Facilities Open to All Comers.—In deciding the suit brought by the Baltimore & Ohio Telegraph Company against the Bell Telephone Company, of Philadelphia, Judge Arnold, in that city on December 7, delivered an opinion settling, for the first time in the State, several important principles of the law relating to modern electrical inventions. The telephone company refused the application of the telegraph company for a telephone in the main office of the latter company, on the ground that by the terms of its contract with the American Bell Telephone Company it was prohibited from furnishing telephones to be used in connection with the transmission of telegrams to any company other than the Western Union Telegraph Company. Suit was brought in the Common Pleas Court, and a mandamus was prayed for directing the telephone company to furnish the desired facilities to the complainant. A writ of peremptory mandamus was awarded.

Fire in New Orleans.—A special dispatch of Dec. 7 from New Orleans says: A singular accident occurred here to-night. The roof of the Bell Telephone Exchange was set on fire, it is presumed, by one of the wires of the Brush electric light coming into contact with a telephone wire. A heavy current ran into the Telephone Exchange and set on fire all the insulation connected with more than 1,000 wires, so that in a few seconds every telephone wire was useless. A large force of linemen was put to work at once, and by midnight nearly half of the wires had been restored, and it is promised all will be in order by daylight. The fact is that our city is being overwoven with a network of wires in which electric, telegraph, and telephone wires are very closely mixed. Several lives have already been lost by contact with electric wires, and more than a dozen fires have occurred in the same way. A committee of the Town Council are considering a proposition to order all electric wires underground.

THE ELECTRIC LIGHT.

Selma, Ala.—A committee of the city councils has been appointed to draw up a contract with the Jenney Electric Light Company, and to obtain from cities using this system information as to its merits.

New Brunswick, N. J.—The Callender Company have shipped a large cable for underground use in the Edison system to be installed at New Brunswick. The cable is two inches in diameter, and has the well-known Callender features and merits. The Company are furnishing all the cables for this installation, contract for which was recently given to the Edison Company.

Northern New York.—Mr. W. A. Giles, Superintendent of the Excelsior Company, Penn Yan, N. Y., reports: "The town of Penn Yan, N. Y., at a public election held Dec. 3, voted on street lighting, giving a large majority in favor of 25 Excelsior lamps over 80 gas lamps now in use." We shall start lamps in Canandaigua latter part of next week. Bath, N. Y, is the town we shall light after that.

Dey Vos So Schmall.—The gas furnished this city is of a very inferior quality, and consequently the streets are very poorly lighted, but they are allowed to burn until after daylight. A stranger asked a prominent druggist: "Why do the gaslights burn all night in this city?" "Because dose gash lights vos so schmall dot dey vas afraid to go oud ven it vas dark."—*Albany Argus.*

Portland, Me.—The following progress is reported from Portland, Me., under date of Dec. 1: The electric lighting interests of this city have this day made a new departure, which has the appearance of great faith in the future of electric lighting in this city, and is said to be justified by the growth and extent of the system since its inauguration here. This afternoon the Consolidated Electric Light Company had a meeting of its directors at the offices on Exchange street in this city, where a plan was submitted which met with approval and was adopted, and action taken to carry it into effect. It was voted to purchase 5,000 square feet of land, in addition to the 15,000 square feet already owned by the company, and to erect thereon a central lighting station building, to be equipped with the necessary steam and electrical apparatus to run 500 arc lights of 2,000 candle power each, and 5,000 Edison incandescent lamps, the latter for the lighting of stores and dwellings. The material for equipping this new building is to be supplied by the Electric Manufacturing Company of New York.

APPLICATIONS OF POWER.

The Daft Motor in Washington.—The Daft motor is likely to be adopted by the proposed new street railway in Washington, which is to take in the Soldiers' Home, the Congressional Cemetery, and other outlying points of interest. At first it was determined to make it a cable road, in case the franchise should be granted. Then the success of the Daft motor in Baltimore became apparent, and all

probabilities are that the Daft system will be adopted. There is no opposition to any part of the road except that along Massachusetts avenue. The projectors are anxiously awaiting the composition of the House and Senate Committees on the District of Columbia before taking any decisive steps.

PERSONALS.

Mr. Charles B. Horton has been appointed agent of the T. M. B. A. at Omaha, vice Mr. L. M. Rheem, resigned.

Mr. W. O. Callender, President of the Callender Insulating and Waterproofing Company, is now on the sea *en route* to London, *via* the West Indies. He visits Trinidad, and is expected in London about this date.

Dr. Collyer's Tired Brain.—The Rev. Robert Collyer recently received an electrical treatment for tired brains at the New York Post-Graduate and Medical School and Hospital. The clergyman's gray locks were soon pointing in all directions. A physician touched Mr. Collyer's knuckles and a flash of fire followed. "Ouch!" exclaimed the clergyman. "My venerable friend, you ought to be through with your courting days, but I see you're still good at sparking."—*New York Express.*

Mr. Thomas D. Lockwood.—This well-known electrician, beginning December 7, delivers a course of lectures before the Lowell Institute, Boston, on "The Electric Telegraph and Telephone." The programme is as follows: 1. The Genesis of the Electric Telegraph. 2. The Principles of Electric and Electro-Magnetic Telegraphy. 3. The Morse System; with Glimpses of Dial, Printing, and Autographic Telegraphy. 4. The Expansion of the Telegraph. 5. The Telephone. 6. The Industrial and Commercial Application of the Telephone.

Miss Susan Morse.—Miss Susan Morse, a daughter of Samuel F. B. Morse, inventor of the telegraph, while en route for Havana, Cuba, on the Spanish mail steamer, disappeared shortly before the arrival of the vessel. It is supposed she threw herself into the sea in a temporary fit of mental aberration. Cyrus W. Field, who is an old friend of the Morse family, was seen at the Metropolitan Opera House on the 7th inst., and said: "I am very much afraid that this report is true. Recently Mr. Morse, a brother of the girl, came to me and said that one of his sisters who had married a planter and is living in Cuba, was insane, and asked my advice. I told him to bring her here to an asylum at once, and offered to aid him to do so. This he declined and went away. Now I presume that this is another sister, a daughter by the second Mrs. Morse, who sailed for Cuba to be with her sister on the voyage back, and that her sister's troubles worried her so much that she also became temporarily insane."

W. E. Connor.—Gould's object in disolving the firm of W. E. Conner & Co., in which he is a special and his son a general partner, is to get rid of his two partners, W. E. Connor and G. P. Morosini. It was understood in Wall street last April that there were dissensions in the firm, and it was expected that it would not be continued after the 1st of May. It was probably found to be impossible to liquidate at that time without great loss, and so the firm was continued. Two of the active partners of the firm were for a long time at daggers' points, and one of them did not hesitate to publicly express his opinion of the other, while young George Gould had no special regard for either of them. About the time of Gould and Fisk's atrocious operations in gold which precipitated the panic of Black Friday, Mr. W. E. Connor was a telegraph operator. Shortly after that awful period he became Gould's confidential broker and subsequently his partner. It has always been understood on the street that Connor held the written link in the evidence which might convict Gould in the multitude of law-suits brought against him on account of his Black Friday operations. These suits, it is said, are now barred by the Statute of Limitations, and that he, therefore, feels free to part with Mr. Connor.—*N. Y. Herald.*

MISCELLANEOUS NOTES.

A Valuable Table.—We have received a neatly printed card from Messrs C. E. Jones & Co., of Cincinnati, containing a table of dimensions, resistances and current capacities of pure copper wire, calculated on the basis of Matthiessen's standard. Electricians will find the table a very useful one, and it can be had gratis upon application to the firm named.

Electrical Condenser for the Microscope.—A handy form of this apparatus has recently been devised by Messrs. Ch. Plumb & Co., of Buffalo, N. Y. It is equally well adapted for microphotography, being universal in its motion, balanced upon a centre, and provided with telescopic joints. A 4 to 6 c. p. incandescent lamp is placed within a parabolic reflector, which throws a powerful beam upon the object.

Bleaching by Electricity.—Cotton manufacturers in St. Petersburg are said to be becoming much interested in the application of electricity for the purpose of bleaching cotton and flax fibres as well as tissues. The material is steeped in water, which is then decomposed by electricity, the oxygen which is thus set free at once acting on the fibres. This process, which has already been described in our columns, has been found to occupy very considerably less time than the ordinary one.

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—Am. Cable, b 66, a 68; Am. Dist., b 29, a 29¼; B. & M., b 2, a 4; Western Union, b 75½, a 75⅝.

Telephone.—Am. Bell, b 171, a 172; Erie, b 27½, a 27⅝; New England, a 30; Mexican, b 1, a 1½; Tropical, a 1.

Electric Light.—No new quotations.

BUSINESS NOTICES.

[Copy.]

W. H. GESNER, SUP'T.

OFFICE OF
THE BRUSH ELECTRIC LIGHT AND POWER CO.,
MONTGOMERY, Ala., Nov. 17, 1885.

Messrs. Giles, Bro. & Co., State and Washington Streets, Chicago, Ill.

DEAR SIRS: I have to acknowledge receipt of my watch with magnetic shield. Please accept my thanks.

I have given the watch a thorough test—held it all about the field magnets of a No. 8 Brush machine, running at 750 rev. per minute and supplying 52 arc lamps, without visible effect.

I consider your magnetic shield a perfect protection from magnetism.

I have ruined three or four watches heretofore, and have spent money enough for repairs to buy a dozen shields almost. Very truly yours,

W. H. GESNER, Sup't.

New Watchman's Clock.—The Utility Manufacturing Company of 55 Fifth Avenue, Chicago, Ill., are introducing a very simple watchman's clock. While employing no electricity, it gives an intelligent account of the movements of the watchman during the night, showing the time of each visit.

Feed-Water Heaters.—The National Pipe Bending Company, manufacturers of the National feed water heaters have arranged for the sale of their heaters in New York by Westinghouse, Church, Kerr & Co., and in Boston by the Jarvis Engineering Company. The new price list takes effect this month. Each house has the adjacent territory to attend to.

Large Belts.—The Jewell Belting Company, of Hartford, Conn., whose product is finding its way into a great many electric installations for lighting and power, makes some enormous belts. One made for a flouring mill is 48 inches wide, 96 feet long, and weighs 1,000 lbs. Two other belts made for a large rubber factory are respectively 48 inches wide and 120 feet long, and 44 inches wide and 150 feet long, both of double thickness.

Catalogue of the Thomson-Houston Electric Light Company.—We have just received the neatly printed and interesting catalogue of this company. All in search of information on the system will find their wants amply supplied by it. The book contains the full description of the Thomson-Houston System which we gave in our issue of March 28, 1885. A long list of testimonials and other interesting matter is contained in the book together with a list of nearly 125 towns in which the system is used.

Pike's Toothache Drops.

Cure in 1 minute; harmless, quick, thorough; no equal; 25c.
DEAN'S RHEUMATIC PILLS are a prompt, sure cure; 50c.
HALE'S HONEY, the great cough cure, 25c., 50c. and $1.
GLENN'S SULPHUR SOAP heals and beautifies the skin; 25c.
GERMAN CORN REMOVER kills corns and bunions; 25c.
HILL'S HAIR AND WHISKER DYE, black and brown; 50c.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED NOVEMBER 24, 1885.

Insulating Tube for Electric Wires; Henry B. Cobb, Wilmington, Del..... 330,873

Over the ends of the section is a closely fitting covering of metal.

Insulating Tube for Electrical Wires; Samuel B. Cobb, Chicago, Ill., Assignor to Henry B. Cobb, Wilmington, Del..... 330,874

Consists of an improvement in the shape and disposition of the invention in patent 330,873.

Telephone Transmitters; Julius Emmner, Jr., Washington, D. C..... 330,879

One electrode is mounted upon the diaphragm and the other is parallel to the first, but fixed independently of it.

Combined Annunciator and Alarm; Frank E. Kinsman, New York, N. Y..... 330,903

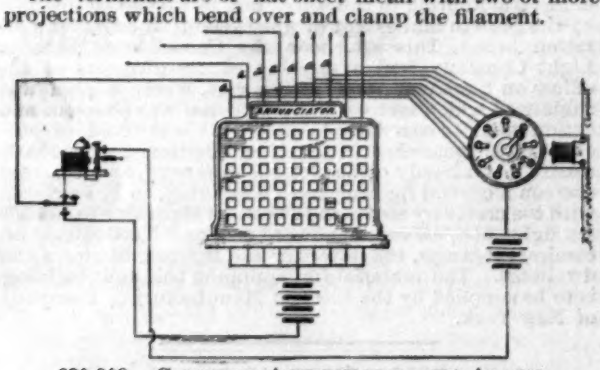
Consists of alarm apparatus placed in return-circuits between a back contact of the signaling push buttons or keys and the central office, and means for connecting all of the annunciator-wires at or near the annunciator or at the hotel office with a battery or other generator of electricity, so as to give a signal or alarm in the rooms in which the signal-bells are placed. The disposition is shown in the cut.

Electric Switch; Merle J. Wightman, Hartford, Conn..... 330,949

Consists of a slight improvement upon the relative locations of cam and operating lever, which is provided with projections.

Clamp for Incandescent Lamp Filaments; Charles G. Perkins, New York, N. Y., Assignor to the Imperial Electric Light Co., same place.. 331,002

The terminals are of flat sheet metal with two or more projections which bend over and clamp the filament.



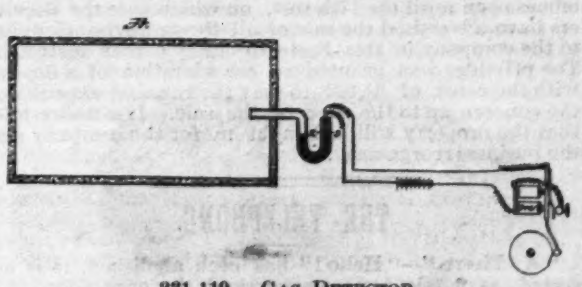
330,903. COMBINED ANNUNCIATOR AND ALARM.

Electric Signal for Railway Cars; John R. De Mier, Chester, Ill..... 331,042

Consists of the combination of an electric battery stationed on the locomotive tender, a positive and a negative conducting-wire fastened to the ceiling of each car, two interchangeable and removable automatic circuit-closers between the cars, fastened above the doorways of the cars, an alarm-bell on the ceiling of each car, and in the engineer's cab, a suitable circuit-closer provided with suitable pull-ropes, whereby the breaking of trains and orders of the train conductor or manager are immediately communicated to the engineer.

Gas Detector; George H. Eaton, North Middleborough, Mass..... 331,119

The operation of the apparatus is dependent upon the natural phenomenon commonly termed "osmose of gases." The vessel *A* is normally filled with air (the same gas at its



331,119. GAS DETECTOR.

exterior), and the liquid in the U-shaped portion is in equilibrium, being at substantially the same level in both branches, and the circuit open, and when a different gas comes in contact with the vessel *A* an interchange takes place through the porous walls thereof; but, owing to the laws which govern such phenomenon, the external gas enters faster than the air escapes through the walls, thus producing a change in the pressure within the chamber which causes the liquid in the tube to rise and close the circuit, causing the signal to operate.

Electrical Apparatus for Dental Operations; Charles A. Eisenhart) York, Pa..... 331,121.

Consists of forceps for extracting teeth, the jaws of the forceps being in an electric circuit and charged with an induced current when the tooth is being pulled.

Automatic Circuit Closer for Telegraph Instruments; James W. McArthur, Walton, Kansas.. 331,148

When the button is grasped by the operator the spring *H* yields, and the connection between the contact-disc and strip *C* is broken, to be again established as soon as the operator releases his grasp.

Armature for Dynamo; Benjamin F. Orton, East Saginaw, Mich..... 331,155.

It is an armature built up from thin superposed sheet-iron strips or plates bent in the armature-plane, and having lateral or transverse projecting portions integral with said strips or plates, and extending parallel with the axis of the armature, the superposed projecting portions being separated from one another by free air-spaces.

Telephone Exchange System; Joseph P. Davis, New York, N. Y..... 331,186

Consists of the combination of a series of subscribers' lines, a series of sectional switch-boards, and an annunciator-board through both of which said lines pass, and an operator's table which is in electrical communication with each of the series of sectional switch-boards.

Electric Gas Lighter; Le Roy S. White, Waterbury, Conn., Assignor to the Electrical Appliance Manufacturing Co., same place..... 331,221

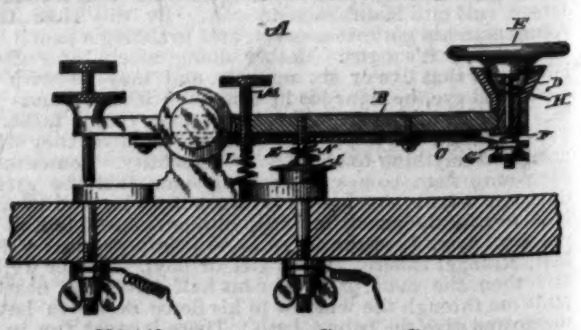
Consists of two electro-magnets and an armature having its metal so disposed with relation to the poles of the two magnets, that when one or other of the magnets operates to lift the armature, the armature will, in rising, also be made to revolve or turn slightly in one or the other direction, so as to bring it into engagement with or free it from a stop or lock, by which the armature will be held raised, and the gas-valve open so long as the burner is used, and until it is desired to close the valve and extinguish the gas.

Telegraph Repeater; Willard M. Miner, Thurlow, Pa..... 331,250

It comprises two electro-magnets, armatures therefor having each two circuit-closing contacts, one of which closes when the armatures are up, and the other when the armature is down, but in which both contacts in one instrument are never both opened at the same time, two line-circuits connecting, respectively, with one or the other of the contacts of said instruments, according as to whether the armature is up or down, lines connecting one of said contacts on each instrument with the electro-magnet of the other instrument, and local circuits having batteries connecting the other contact of each instrument with the electro-magnet of the other instrument.

Automatic Electric-Annunciator; Charles W. Price, New York, N. Y., and Albert Barrett, Kansas City, Mo..... 331,257

Instead of employing a catch to hold the shutter upright or at normal, they have it upon trunnions or pivotal screws,



331,148. AUTOMATIC CIRCUIT-CLOSER.

so that it occupies a horizontal position with the numbered face or surface down.

Telephone; Webster Gillett, New York, Assignor to the Atlantic & Pacific Telephone Co., Saco, Me..... 331,652

Consists of slight improvements upon that class of telephones having granulated carbon between the electrodes, and which are pivoted to a handle,